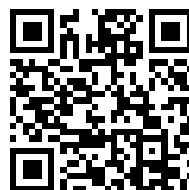


---

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google<sup>TM</sup> books

<https://books.google.com>



# **SOUTH INDIAN OCEAN PILOT**

**COMPRISING  
MADAGASCAR, ILES COMORES, ILE DE LA  
RÉUNION, MAURITIUS, THE SEYCHELLES, THE  
CHAGOS ARCHIPELAGO, AND OTHER ISLANDS  
LYING WESTWARD OF LONGITUDE 80° EAST**

**SIXTH EDITION  
1946**



## CAUTION

Caution  
of the c

(1) My  
the fact i  
this is to  
of the po  
the signa  
paragrap  
by them.  
approach

(2) If  
or three  
position  
indicated

If these  
caution,  
vessel or

(3) At  
exhibited  
searchligh  
that grea  
in paragi

(4) In  
examine

(5) In  
paragrap

the port and of allotting positions in which they shall anchor. If Government vessels, or vessels belonging to the local port authority, are found patrolling in the offing, merchant vessels are advised to communicate with such vessels with a view to obtaining information as to the course on which they should approach the port. Such communication will not be necessary in cases where the pilot on board has already received this information from the local authorities.

(6) As the institution of the Examination Service will probably be unknown to vessels desiring to enter the port, especial care should be taken in approaching the ports, by day or night, to keep a sharp lookout for any vessel carrying the flags or lights mentioned in paragraph (7), and to be ready to "bring to" at once when hailed by her or warned by the firing of a gun or sound rocket.

In approaching by night any port in the British Empire, serious delay and risk will be avoided if four efficient all round lanterns, two *red* and two *white*, are kept available for use.

(7) By day the distinguishing flag of the Examination vessel will be a special flag (white and red horizontal surrounded by a blue border).

Also, three *red* balls vertically disposed if entrance is prohibited.

Usually the Examination vessel will fly the blue ensign, but in certain circumstances she may fly the white ensign.

By night the steamer will carry: (a) Three *red* lights vertically disposed if entrance is prohibited; (b) three *white* lights vertically disposed if entrance is permitted.

The above lights will be carried in addition to the ordinary navigation lights, and will show an unbroken light around the horizon.

(8) Merchant vessels approaching a British port, at which the Examination Service is in force, must hoist their signal letters on arriving within visual signalling distance of the port and are not to wait for the signal "What is the name of your vessel?" to be made from the Examination vessel.

(9) Masters are warned that, before attempting to enter any port when the Examination Service is in force, they must in their own interests strictly obey all instructions given to them by the Examination vessel.

Whilst at anchor in the Examination Anchorage, Masters are warned that it is forbidden, except for the purpose of avoiding accident, to do any of the following things, without permission from the Examination Officer:—(a) To lower any boat; (b) to communicate with the shore or other ships; (c) to move the ship; (d) to work cables; (e) to allow any person or thing to leave the ship.

(10) In case of fog, Masters of vessels are enjoined to use the utmost care, and the port should be approached with caution.

(11) When the Examination Service is in force, merchant vessels when approaching ports are especially cautioned against making use of private signals of any description, either by day or night; the use of them will render a vessel liable to be fired on.

(12) The pilots attached to the ports will be acquainted with the regulations to be followed.

## THE LIBRARY



656

G79si

TISH PORTS.  
ce to Mariners No. 1  
cts mentioned below.

## TS.

en into consideration  
n ports of the Empire,  
British Isles, or any  
ut should be kept for  
vessels mentioned in  
nd other signals made  
t or locality should be  
structions may exist.  
lly disposed by night,  
in some conspicuous  
shown by the vessels

port with the greatest  
by the Examination

ghts are occasionally  
directing moveable  
mariners are warned  
the signals indicated  
be working.

## VICE.

special measures to  
come or abroad.

lights mentioned in  
which desire to enter

**NOTATIONS OF SUPPLEMENTS AND ANNUAL  
SUMMARIES OF NOTICES TO MARINERS  
RELATING TO THIS BOOK.**

**To be filled in by Navigating Officer.**

**(In Chart Depôts the first two columns are alone to be filled up.)**

<b>Title.</b>	<b>Date of Publication and Number.</b>	<b>Whether pasted in or noted in Margins of Book, and Date of each Correction.</b>

**CAUTION.**

**Attention is called to British Admiralty Notices to Mariners  
Nos. 1, 4 and 7, which are published annually.**





THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.

THE VOLUME SHOULD NOT BE USED WITHOUT  
THE PERMISSION OF THE LIBRARY AND SHOULD  
NOT BE LOANED TO OTHERS WITHOUT THE  
PERMISSION OF THE LIBRARY.



## NOTICE.

---

This volume should not be used without reference to the latest Supplement and Annual Summary of Notices to Mariners affecting it which may have been published.

A Supplement to this volume will generally be published annually until the latter is again taken up for revision.

After the publication of Supplement No. 1, each succeeding supplement cancels the former.

Between the time of the volume being taken up for revision and the publication of the new edition no supplement will be issued, but early in each year a Summary of the Admiralty Notices to Mariners affecting the volume, which have been published during the preceding year, will be issued as a separate publication.

The publication of all Supplements and Summaries of Notices to Mariners is announced in Admiralty Notices to Mariners.

The latest Supplement and any Annual Summary of Notices to Mariners that has been published affecting this volume will be obtainable gratuitously by purchasers of this volume from the Agents for the sale of Admiralty charts and other Hydrographic publications, on application either personally or by letter; in the latter case the cost of postage must be enclosed. For a list of these Agents see Admiralty Notice to Mariners No. 2, published annually.



# **SOUTH INDIAN OCEAN PILOT**

**COMPRISING**

**MADAGASCAR, ILES COMORES, ILE DE LA  
REUNION, MAURITIUS, THE SEYCHELLES, THE  
CHAGOS ARCHIPELAGO, AND OTHER ISLANDS  
LYING WESTWARD OF LONGITUDE 80° EAST**

**SIXTH EDITION, 1946**

**ALL BEARINGS ARE TRUE**

*Crown Copyright Reserved*

**LONDON**

**PUBLISHED for the HYDROGRAPHIC DEPARTMENT, ADMIRALTY**

To be obtained from the  
Agents for the Sale of Admiralty Charts  
145, MINORIES, E.C.3

**1946**

**Price**

**Seventeen Shillings and Sixpence Net**

UNIVERSITY OF MINNESOTA LIBRARY

ST. PAUL, MINN.

Digitized by Google

To face page ii.]

656

G 79 si

## **CAUTION.**

IN THIS WORK THE BEARINGS ARE ALL TRUE, AND WHEN GIVEN IN DEGREES ARE RECKONED CLOCKWISE, FROM 000° (NORTH) TO 359°.

THE BEARINGS OF LIGHTS ARE GIVEN FROM SEAWARD.

THE LATITUDES AND LONGITUDES GIVEN IN THE TEXT ARE APPROXIMATE.

THE DISTANCES ARE EXPRESSED IN NAUTICAL MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO THE TENTH PART OF A NAUTICAL MILE.

THE DEPTHS ARE GIVEN BELOW CHART DATUM LEVEL WHERE NOT OTHERWISE STATED.

HEIGHTS ON THE LAND ARE GIVEN ABOVE MEAN LEVEL OF HIGH WATER SPRING TIDES.

FIGURES IN BRACKETS GIVEN AFTER THOSE DENOTING FEET, FATHOMS AND YARDS ARE THEIR EQUIVALENTS IN METRES.

TIME IS EXPRESSED IN THE FOUR-FIGURE NOTATION COMMENCING AT MIDNIGHT.

THE TERM "STEAM VESSEL" USED HEREIN INCLUDES ANY VESSEL PROPELLED BY MACHINERY.

A NAME IN BRACKETS, IMMEDIATELY FOLLOWING ANOTHER NAME, IS THE OBSOLETE NAME WHICH IS STILL SHOWN ON THE ADMIRALTY CHARTS. AS A GENERAL RULE, THE BRACKETED NAME IS ONLY INSERTED IN THE DESCRIPTION OF THE PLACE OR OBJECT PREVIOUSLY BEARING THAT NAME.

WHEN SHADING IS USED TO INDICATE COLOURS OF FLAGS, TIDAL LIGHT SIGNALS, OR BEACONS, IT IS AS FOLLOWS:



Yellow.



Red.



Blue.



Green.



Black.





## ADVERTISEMENT

This work contains a description of Madagascar Ile, de la Réunion, Iles Comores, Îles Glorieuses, and other French possessions, which are dependencies of Madagascar; Mauritius, and the several groups included in its government, viz., Rodriguez, Cargados Carajos, Tromelin, Agalega, and the Chagos archipelago with Diego Garcia; the Seychelles and the small island groups under its administration, viz., Amirante, Providence, St. Pierre, Farquhar, Cosmoledo, Astove, Assumption, Aldabra, Coetivy, and all adjacent islets. Also a description of Saya de Malha and Seychelles banks, together with that of Ile Amsterdam and Ile Saint-Paul.

This, the sixth edition, has been prepared by Commander F. C. Hanning-Lee, R.N., and contains the latest information.

The meteorological information has been revised by the Meteorological section of the Air Ministry. Temperature is expressed in degrees Fahrenheit; rainfall in inches; speed in knots; and distance in nautical miles, unless expressly stated otherwise. Information received from meteorological services which do not use these units has been converted into the units mentioned above by the Meteorological Office.

Mariners and others are invited in the interests of navigation to forward to the Hydrographer of the Navy, Admiralty, London S.W.1, any information that may come under their notice, which would be useful for the correction of the charts and other hydrographic publications issued by the British Admiralty; *early* advice as to newly-discovered dangers, the establishment of, or changes in, any aids to navigation, is especially requested.

Copies of a form (H.102), on which to render information, can be obtained gratis from the Hydrographer of the Navy, Admiralty, London, S.W.1; or from any of the Agents in Great Britain and abroad, a list of whom is published, annually, in Admiralty Notice to Mariners No. 2.

By the publication of this book, the fifth edition of the South Indian Ocean Pilot, 1934, and its Supplement No. 8, 1945, are cancelled, and all information affecting that work, contained in Notices to Mariners up to and including No. 2902 of 1946, has been embodied in this volume; for Temporary and Preliminary Notices to Mariners affecting this edition, the list of Temporary and Preliminary Notices to Mariners in force, published monthly in the weekly edition of the Admiralty Notices to Mariners, should be consulted.

A. G. N. WYATT,  
*Rear-Admiral, and*  
*Hydrographer of the Navy.*

*Hydrographic Department,  
Admiralty, London.  
16th August, 1946.*

## BIBLIOGRAPHY

The following works, other than British Government publications, have been consulted in the preparation of this edition :—

For Madagascar and its dependencies, Ile de la Réunion, and Ile Amsterdam and Ile Saint-Paul :—

No. 372. Instructions Nautiques, Madagascar et Iles Éparses des Océans Indien et Austral, 1934, and Fascicule, 1946.  
Phares et Signaux de Brume, Série L, 1942, and Fascicule, 1945.

For general purposes :—

The Statesman's Yearbook, 1944.



## CONTENTS

---

	PAGE
Caution . . . . .	<i>facing</i> ii
Advertisement . . . . .	iii
Bibliography . . . . .	iv
Contents . . . . .	v
List of views . . . . .	vii
Geographical terms in use on Charts, &c., of Madagascar	viii
System of Orthography . . . . .	ix
Information relating to charts, &c. . . . .	xiii
Index charts . . . . .	<i>facing</i> 1

---

### CHAPTER I

Islands and groups—Currents—Miscellaneous information —Regulations—Communications—Air lights—Radio stations—Signals—Approaching Squadrons or Aircraft carriers—Passages—Meteorology . . . . .	1-62
--	------

---

### CHAPTER II

Seychelles and Amirante groups—Alphonse and Coetivy islands . . . . .	63-89
--	-------

---

### CHAPTER III

Aldabra islands—Assumption island—Cosmoledo group— Astove island—St. Pierre and Providence islands— Farquhar group—Agalega islands—Saya de Malha bank . . . . .	90-103
--	--------

---

### CHAPTER IV

Chagos archipelago . . . . .	104-115
------------------------------	---------

---

### CHAPTER V

Islands and dangers in Mozambique channel—Slot Van Capelle . . . . .	116-144
---	---------

	PAGE
<b>CHAPTER VI</b>	
Madagascar, north-western coast—Cap d'Ambre to Pointe d'Angadoka . . . . .	145-185
<hr/>	
<b>CHAPTER VII</b>	
Madagascar, north-western coast—Pointe d'Angadoka to Cap Saint-André . . . . .	186-221
<hr/>	
<b>CHAPTER VIII</b>	
Madagascar, western coast—Cap Saint-André to Cap Sainte-Marie . . . . .	222-258
<hr/>	
<b>CHAPTER IX</b>	
North-eastern coast of Madagascar ; Cap d'Ambre to Baie d'Antongil . . . . .	259-288
<hr/>	
<b>CHAPTER X</b>	
Eastern and southern coasts of Madagascar . . . . .	289-328
<hr/>	
<b>CHAPTER XI</b>	
Tromelin island—Cargados Carajos shoals—Ile de la Réunion—Mauritius—Rodriguez island—Ile Amsterdam and Ile Saint-Paul. . . . .	329-371
<hr/>	
<b>APPENDICES</b>	
I.—List of ports available for under-water repairs . . . . .	372-373
II.—List of principal ports, with particulars of depths . . . . .	374-375
III.—Magnetic observation spots . . . . .	376
Index . . . . .	377-405

## LIST OF VIEWS

---

LOCALITY	ON OR FACING PAGE
Leading mark for Baie d'Ambavatoby . . . . .	184
View, in two parts, of approach to Baie de Diégo-Suarez from 23 miles south-eastward . . . . .	261
Two views of approach to Baie de Vohémar . . . . .	274
View, in three parts, of approach to Rade d' Antalaha . . . . .	275
Three views of Baie de Tintinga . . . . .	290
View, in two parts, of approach to Mananjary from 4 miles east- ward . . . . .	306
Approach to Mananjary from 8 miles eastward . . . . .	306
Coast northward of Vatomandry . . . . .	307
View, in two parts, of approach to Rivière Mananara from east- ward . . . . .	320
Sakarivo and Torotoro from eastward . . . . .	321
View, in two parts, of approach to Fort Dauphin . . . . .	321
Ile Saint-Paul . . . . .	369
Ile Saint-Paul. Entrance to the crater basin . . . . .	369



## GLOSSARY

of some of the Geographical terms used in Madagascar, which appear on the charts and are used in the sailing directions.

Ambato . . . . .	Rock.
Ampanalana, Andilana . . . . .	Isthmus.
Ampasimena . . . . .	Red sand.
Bé . . . . .	Grand.
Bongo . . . . .	Mountain.
Fasika . . . . .	Sand.
Foti, Fotsi . . . . .	White.
Harama . . . . .	Coral, rock.
Hori . . . . .	Bay.
Jia . . . . .	Sand.
Keli . . . . .	Little.
Lalandriaka . . . . .	Rivulet.
Lava . . . . .	High, tall, long.
Lovoka . . . . .	Bay.
Mainti . . . . .	Black.
Mandri . . . . .	Quiet.
Masondrano . . . . .	River bed.
Mati . . . . .	Dead.
Mpanjaka . . . . .	Chief, headman.
Nosy . . . . .	Island.
Oni . . . . .	River.
Orongia . . . . .	Point of sand.
Orontani . . . . .	Peninsula, cape.
Rova . . . . .	Fort.
Saha . . . . .	River.
Seranana . . . . .	Port.
Soa . . . . .	Good.
Tafiana . . . . .	Harbour, anchorage.
Tananabé . . . . .	Hand or arm.
Tanana . . . . .	Town.
Tanga . . . . .	Mangroves.
Tani Keli . . . . .	Isthmus.
Tanjona . . . . .	Cape.
Todiana . . . . .	Harbour, anchorage.
Tondro . . . . .	Finger.
Valavo, Voalavo . . . . .	Rat.
Vao . . . . .	New.
Vato, Vatobé . . . . .	Rock, stone.
Vavo . . . . .	Mouth of river.
Vohitra . . . . .	Mountain.
Vori . . . . .	Round.
Vorona . . . . .	Bird.

## SYSTEM OF ORTHOGRAPHY.

---

The following rules for the spelling of geographical names (termed the R.G.S. II system) have been adopted for British official use, and the names in Admiralty Hydrographic publications will be rendered in accordance with these rules as opportunity occurs.

In new editions of the various volumes of sailing directions names are, generally speaking, given in accordance with these rules, but where the name on the chart shows an older rendering of a name, such chart name is given in brackets after the new rendering and will also be given in the Index.

The rules for spelling in the R.G.S. II system are as follows :—

- (1) The spelling of every place-name in an independent country or self-governing dominion using the Roman alphabet (including "Roman" alphabets containing extra or modified letters, such as Czech, Serb-Croat, Polish, Romanian, etc.) shall be that adopted by the country or dominion.
- (2) In colonial possessions the spelling of such place-names as belong to languages coming under Rule (1) will be spelt in accordance with that rule.
- (3) The accents and diacritical marks in official use by the above countries will be retained. Wherever it appears desirable, the pronunciation will be shown by giving the name as transliterated on the system below.
- (4) All other place-names throughout the world will be spelled in general accordance with the following system.

The broad features of this system are—

- (a) That vowels are pronounced as in Italian and consonants as in English :
- (b) That every letter is pronounced, and no redundant letters are used.

This system aims at giving a close approximation to the *local* pronunciation ; but it is recognised that in some languages, notably Russian, Greek, and Arabic, the necessity for letter-for-letter transliteration often renders this impossible.

## TABLE OF SPELLING AND PRONUNCIATION R.G.S. II.

<b>a</b>	The long and short Italian vowels, as in <i>lāvā</i> ..	Somāli; Rāvennā.*
<b>ā</b>	Between <i>a</i> in <i>fat</i> and <i>e</i> in <i>eh</i> ?; chiefly in Teutonic and Finno-Ugrian languages .. .. .	Māhring; Pärnu.
<b>ai</b>	The two Italian vowels, frequently diphthongal, almost as in <i>aisle</i> ; but pronounced <i>ei</i> and <i>ē</i> in Greek names .. .. .	Wadai; Shanghai.
<b>au</b>	The two Italian vowels; frequently diphthongal; almost as <i>ou</i> in <i>out</i> .. .. .	Sakau; Bauchi.
<b>aw</b>	When followed by a consonant, or when terminal, as in <i>awl</i> , <i>law</i> .. .. .	Dawna; Saginaw.
<b>b</b>	As in English.	
<b>c</b>	Not to be used, but always replaced by <i>k</i> or <i>s</i> ; except in the compound <i>ch</i> , and in many conventionally-spelt words, as .. .. .	Kandahar; Serang. Calcutta; Celébes.
<b>ch</b>	As in <i>church</i> ; never <i>tch</i> or <i>tsch</i> for this sound ..	Chad; Kerch.
<b>d†</b>	As in English.	
<b>dh</b>	Soft <i>th</i> as in <i>they</i> ; a slight <i>d</i> sound sometimes preceding it in Semitic languages .. ..	Hadhramaut; Riyadh.
<b>e</b>	Long as in <i>eh</i> ? short as in <i>bet</i> . (For the <i>e</i> sound in the French <i>je</i> , see note at end on the "neutral vowel.") .. .. .	Gēlo; Mafeking.*
<b>(ee)</b>	Used for <i>i</i> ( <i>q.v.</i> ) only in a few conventional names	Darjeeling; Keelung.
<b>ei</b>	The two Italian vowels, frequently diphthongal as in <i>rein</i> , but pronounced <i>i</i> in Greek names ..	Beirut; Raheita.
<b>(eu)</b>	Not used as a single sound.	
<b>f</b>	As in English; <i>ph</i> must not be used for this sound	Mustafa; Maidan-i-Naftun.
<b>g</b>	Hard, as in <i>get</i> , <i>gift</i> : never as in <i>gem</i> , <i>gin</i> ..	Gedāref; Gilgit.
<b>gh</b>	Soft guttural, the Arabic <i>ghain</i> .. .. .	Ghadames; Baghdad.
<b>h</b>	Used only when sounded; or in the compounds <i>ch</i> , <i>dh</i> , <i>gh</i> , <i>kh</i> , <i>sh</i> , <i>th</i> , <i>zh</i> .. .. .	Ahmadabad; Abdullah.
<b>i</b>	Long as in <i>marine</i> ; short as in <i>piano</i> .. ..	Fiji; Kibonde.
<b>j</b>	As in English; except in transcription of Chinese, where it equals <i>zh</i> , or the French <i>j</i> .. ..	Juba, Ujiji (Eng. <i>j</i> ); but Jaoping (Fr. <i>j</i> ).
<b>k</b>	As in English; hard <i>c</i> should never be used (except in conventionally-spelt words)—thus, not Corea, Cabul, but .. .. .	Korea; Kabul.
<b>kh</b>	Hard aspirated guttural, as in the Scottish <i>loch</i> (not as in <i>lock</i> ) .. .. .	Khan; Sebkha.
<b>l†</b>	} As in English.	
<b>m†</b>		
<b>n†</b>		

\*The long and short symbols given here are merely for explanation, not for use.

†See note at end on *Liquid Sounds*.

- ng** Has three separate sounds, as in *vanguard*, *finger*, and *singer*. If necessary to distinguish, a hyphen may be placed, as in *van-guard*, *singer*-. . . In-galla; Bongo; Ng-ami; Tong-a.
- ngg** May be used for the sound of *ng* as in *finger* . . . Trengganu; Yanggang-a.
- o** Long as in *both*†: short as in *rotund* . . . Kigōma; Hōnōlulu.\*
- ō** As in German; equals the French *eu* in *peu*; or nearly the English sound in *fur* . . . Barkōl.
- (oo)** Used for *u* (*q.v.*) only in a few conventional names, chiefly Indian and Chinese . . . Poona; Foochow.
- oi** The two Italian vowels; frequently diphthongal as in *oil*, but pronounced like *i* in *fit* in Greek names . . . Hanoi.
- ōi** The diphthong as in French *œil* and Norwegian *høi* . . . Hōiland.
- ou** Dissyllabic, and not as French or English *ou*, except in Greek names where it has the French value . . . Zlatoust; Yaroua.
- ow** Used as a diphthongal combination of *ō* and *w* only in the romanisation of Chinese . . . Hankow.
- p** As in English.
- ph** As in *loophole*; not to be used for the *f*-sound, except conventionally . . . Chemulpho; Haiphong.
- q** Represents *only* the Arabic *qaf* and the Hebrew *qof*; i.e. a guttural *h* (as a rule) . . . Qena; Qiryath.
- qu** Should never be employed to represent the sound of *kw*; thus, not Namaqua, Quorra, but . . . Namakwa; Kworra.
- r** As in English; should be distinctly pronounced.
- s†** As English *ss* in *boss*, not as in *these* or *pleasure* . . . Burgos; Masikesi.
- sch** As in *discharge* . . . Peschanka.
- sh}†** As in English.
- t†**
- th** Hard *th* as in *thick*, not as in *this* (except conventionally in Fijian) . . . 'Athlith; Thingvellir.
- u** Long as in *rude*, or as *oo* in *boot*; short as in *pull* . . . Zūlu; Rūanda.\*
- ti** As in German: equals the French *u*, as in *tu* (Fr.) . . . Ūskūdar.
- v}†** As in English.
- w}†**
- x}**
- y** Always a consonant, as in *yard*; it should not be used as a terminal vowel, *e* or *i* being substituted; e.g. not Kwaly or Wady, but . . . Kikuyu; Maya. Kwale; Wadi.
- z** As in *gaze*, not as in *azure*.
- zh** As the *s* in *treasure*, the *z* in *azure*, or the French *j* in *je*; but for the sound in Chinese use *j* (*vide* note about under *j*) . . . Zhob.

\*The long and short symbols given here are merely for explanation, not for use.

†See note at end on *Liquid sounds*.

‡The true Italian *ō* is broader than this; almost as in *broth* (=R.G.S. II *aw*). The letter *o* is conventionally used for this sound in certain names in Nigeria, Tonga, etc.: e.g. Oyo, Fofoa.

## NOTES.

The doubling of a vowel or a consonant is only necessary when there is a distinct repetition of the single sound, and should otherwise be avoided .. ..

Nuusafee; Moorea;  
Jidda; Muhammad.

Accents should not generally be employed; but in order to indicate or emphasize the stress, an acute accent may be used .. ..

Sarawak; Qántara;  
Tong-atábu; Paraná.

A long or short mark over a vowel (e.g. ā, ō) should only be used (and that sparingly) when without it there would be danger of mispronunciation ..

Kūt; Kyōto; Abōso.

Hyphens will not be used except to indicate pronunciation and with the particle *-i-* (in Persian, Fijian, etc.) .. ..

Ta-if; Pusht-i-Kuh;  
Nuku-i-Ra.

**Inverted comma and apostrophe.**—The inverted comma ' is employed only to represent the Arabic *'ain*, the Maltese *'ghain*, and the Hebrew *'ayin*. The apostrophe ' in foreign words indicates a liquid sound (*see* below).

**Liquid sounds.**—The occasional "liquid" or "palatalised" sound of *d, l, n, s, t*, etc. (as in *d'you, lure, new, pursue, tune*, etc.) is as a rule sufficiently represented by a following *y*; where, however, owing to a following consonant, or to the palatalised letter coming at the end of a word, the *y* is inapplicable, the liquid sound will be represented by an apostrophe, thus: *d', l', n', s', t'*, etc.

**The "Neutral vowel."**—The "indeterminate" or "neutral" vowel sound (*er*), i.e. the sound of *a* in *marine*, *e* in *often*, *i* in *stir*, *io* in *nation*, *o* in *connect*, *ou* in *curious*, *u* in *difficult*, etc., *e* in French *je*, or the often unwritten vowel (*Fat-ha*) in Arabic, etc., is represented as a rule by *a* as in Basra, Hawiya; but sometimes by *e*, when the sound approximates more to *e* than to *a*; as Meshed, El Gezira.

(In any guide to pronunciation issued by the Permanent Committee on Geographical Names, the "neutral vowel" is represented generally by the italic *e*; occasionally also by italic *a* or *u*.)

This sound must not be confused with *e-mute*, where the *e* is not sounded at all: as in Abbeville.

**Nasal vowels.**—In illustrating the pronunciation of French, Portuguese, Polish, etc., nasal vowels, the nasalisation will be represented by italic *n*; as Częstochowa pr. Chānstokhóva.

**Note.**—The Royal Geographical Society has published a book entitled "Alphabets of Foreign Languages transcribed into English according to the R.G.S. II system." This book enables the correct rendering of names to be obtained, also of names in languages which are transliterated letter for letter.

## INFORMATION RELATING TO ADMIRALTY CHARTS AND PUBLICATIONS, AND GENERAL NAVIGATION.

### ON THE CORRECTION OF ADMIRALTY CHARTS.

**Guides to Navigation.**—In addition to the charts, the navigational publications which are primarily affected by the continual changes and alterations that take place are the Admiralty Sailing Directions, the Admiralty List of Lights, Fog Signals and Visual Time Signals, and the Admiralty List of Radio Signals. The Admiralty Notices to Mariners contain information mainly for the correction of the charts and navigational publications. 6

### CHARTS.

**1. Degree of Reliance.**—While the Admiralty charts can 10 be relied upon to be correct for all information received, it should be clearly understood that the value of a chart depends on the character of the original survey and on the completeness of the reports of subsequent changes. The remarks on "The Use of Charts as Navigational Aids, &c.", which are subjoined should be carefully 16 studied in this connection.

**2. System of Dating and Issue of Corrected Copies.**—Admiralty charts after first publication, are kept corrected by means of new editions, large corrections, and small corrections. Copies of charts issued by the Hydrographic Supplies Establishment, 20 Admiralty Chart Agents or Admiralty Chart Dépôts are corrected, except from temporary and preliminary Notices to Mariners, for all navigational information to the date of issue.

**New charts.**—The date of publication of a chart is shown outside the bottom margin, in the middle, e.g. :— 26

Published at the Admiralty 30th May, 1938.

**New Editions.**—When a chart is revised throughout and modernised in style a new edition is published, the date being shown outside the bottom margin and to the right of the date of publication, e.g. :—

*New Edition 2nd Jany., 1938.* 30

All large and small corrections notations are at the same time erased, and all old copies of the charts are cancelled.

**Large Corrections.**—When a chart is corrected from important information which is too comprehensive to promulgate by Admiralty Notice to Mariners or to insert conveniently by hand on existing 36 copies, but when the chart is not revised throughout, the date on which these corrections are made is shown on the chart outside the bottom margin and to the right of the date of publication, and in the case of a chart already marked with a new edition date, below such date, e.g. :—

*Large corrections 10th Feb., 1938* 40

All small corrections notations are at the same time erased, and all copies of the chart are cancelled.

*Small Corrections.*—

- 5 (i) When a chart is corrected from the information promulgated in an Admiralty Notice to Mariners (except temporary and preliminary Notices), the year, if not already shown, and number of the notice are entered in the bottom left-hand corner of the chart, e.g. :—

*Small corrections 1938-903.*

- 10 Copies of the chart stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents and the Admiralty Chart Depôts are corrected by hand from such information.

- 15 (ii) When a chart is corrected from information which is considered of no importance from the standpoint of safe navigation, and which is, therefore, not promulgated in an Admiralty Notice to Mariners, the year, if not already shown, and date of the correction are entered on the chart, in one of two ways, in the bottom left-hand corner below the margin and in sequence with the  
20 notations referred to in the preceding paragraph, e.g. :

*Small corrections, 1938—*5.20*—*

*or Small corrections 1938—*(VI.25)

- 25 These indicate that the chart received minor corrections on the 20th May or 25th June, respectively.

- In such cases copies of the chart held by ships and establishments are not usually replaced by new copies, but in exceptional cases, e.g., when new compasses are inserted, new copies of the charts may be supplied. It  
30 should, however, be particularly noted that the absence of corrections represented by square or bracket dates from a chart does not invalidate it for navigation.

- 3. Correction of Charts in Ships.**—All small but important corrections affecting navigation that can be made to the charts by  
35 hand are promulgated in Admiralty Notices to Mariners and, with the exception of corrections from temporary or preliminary Notices, should at once be neatly made in waterproof violet ink on the charts affected, the year (if not already shown) and numbers of the notices being inserted, also in waterproof violet ink, in the bottom  
40 left-hand corner of the chart. The recognised abbreviations shown on Admiralty chart No. 5011 ("Signs and abbreviations used on Admiralty Charts") should be used.

Generally speaking, the amount of information which should be inserted on a chart should be in accordance with that already shown.

- 45 *On large scale charts*, the abridged descriptions, as shown on chart No. 5011, of all details of all lights, light-buoys and fog signals, and the year dates of obstructions, reported shoals, dredged channels, depth on bars or in shifting channels, and irregularities of lights, should be inserted.

- 50 *On coastal charts*, the abridged descriptions of only the principal lights and fog-signals, i.e., those to assist in approaching or making the land, should be inserted.



Particulars of such lights should be omitted, in the following order, as the scale of the chart decreases, viz. :—

- (i) Elevation, (ii) Period, (iii), Number in Group, and (iv) Visibility.

Particulars of fog signals should be inserted in their appropriate positions if space permits, but should otherwise be entered in a tabulated list under the title or some other convenient place on the chart.

Inner harbour light-buoys and beacons should not be inserted on coastal charts, and against other light-buoys only the character of the light should be inserted.

*On ocean charts*, lights which are visible 15 miles or over should alone be inserted and then only their character and colour.

*On all charts*, writing should be inserted as much as possible clear of the water, unless the relative objects are on the water and care should be taken not to obliterate any information already on the chart. When cautionary or tidal notes, &c., are inserted, they should be written in a convenient but *conspicuous* place, preferably near the title, where they will not interfere with other details.

Erasures should never be made but the details should, when necessary, be crossed through in waterproof violet ink.

Admiralty Notices to Mariners are occasionally accompanied by reproductions of portions of charts (known as "blocks"), and when correcting charts from such blocks the following points should be borne in mind :—

- (i) A block may not only indicate the insertion of new information, *but also the omission of matter previously shown*. The latter would, however, invariably be mentioned in the text of the Notice, and the fact that a block accompanies a Notice should not cause the text of the Notice to be disregarded.
- (ii) The limiting lines of a block are determined for convenience of reproduction and need not be adhered to when cutting out for pasting on the chart, provided that the point mentioned in the preceding paragraph is taken into consideration.
- (iii) The new information shown on a block can sometimes be inserted on the chart by hand, the reason for issuing a block in such a case being to avoid a long description of the new information in the text of the Notice.
- (iv) Owing to distortion the blocks do not always fit the charts exactly, care should therefore be taken when pasting a block on to a chart that the more important navigational corrections fit as closely as possible. This can best be assured by fitting the block while it is dry and making two or three pencil ticks round the edges for use as fitting marks after the paste is applied.

Corrections from Temporary or Preliminary Notices to Mariners should be inserted on the charts *in pencil* and the year and number of the notice should be shown against them, e.g. :—N.M. 742 temp. and also in the bottom left-hand corner of the chart, in pencil, *below* the small corrections notations (*see above*). Temporary corrections should be rubbed out when the notice is received cancelling them, but preliminary corrections should be inked in when the notice is received reporting that the changes have been made.

Charts stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents and the Admiralty Chart Depôts are *not* corrected from Temporary or Preliminary Notices to Mariners, and when charts are received from one of these sources they should be  
 5 corrected in pencil as necessary from the copies of such Notices already held, or from those supplied with the charts.

Corrections from Radio Navigational Warnings concerning derelicts and drifting obstructions, the temporary extinction of lights, displacement of important aids to navigation, ice reports &c., should  
 10 also be noted *in pencil*, as received, on the charts affected. Radio Navigational Warnings of a permanent nature and those relating to derelicts and drifting obstructions dangerous to navigation are re-issued in the form of Admiralty Notices to Mariners, but other warnings are not re-issued in this way, except in special circumstances.

16 Corrections from information received from authorities other than the Admiralty should be noted, *in pencil*, on the charts affected, but no charted danger is to be expunged without the authority of the Hydrographer of the Navy.

### NAVIGATIONAL PUBLICATIONS.

#### 20 Admiralty Sailing Directions, Supplements, &c.

1. The Admiralty Sailing Directions, consisting of about 70 volumes for the whole world, contain general information useful to the navigator.

An index chart bound near the beginning of each volume shows the area dealt with and the serial numbers and limits of all Admiralty  
 25 charts for the area which were published *when the volume was printed*.

Each volume is periodically revised throughout, and, in the intervals between the publication of new editions, Admiralty Notices to Mariners and Supplements are published to enable the volume to be corrected. It should, however, be clearly understood that Sailing Directions cannot  
 30 be correct in all minor details after the date of the latest Supplement.

The above-mentioned corrections are not made in the Sailing Directions stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts.

A new edition of each volume of Sailing Directions is published at  
 35 intervals of approximately from ten to twelve years. The number of the latest Admiralty Notice to Mariners used in its compilation is given in the "Advertisement" on page iii of each volume, and the numbers of the Notices affecting it between the dates of going to press and issue to ships and establishments are given in the Notice  
 40 announcing its publication, to enable the new edition to be corrected before being brought into use.

A Supplement to each volume is generally published annually, each succeeding Supplement cancelling the former. When a volume is taken up for revision, however, no further Supplement to that edition  
 45 is issued, but subsequent Notices to Mariners affecting it are summarised each year and issued as a separate publication, until the new edition of the volume is published.

A tabular form for notation of the existence of Supplements and Summaries of Notices is printed on the front fly-leaf of all Sailing  
 50 Directions, and these notations are made as necessary in all copies issued by the Hydrographic Supplies Establishment and the Admiralty Chart Depôts.

Supplements and Summaries of Admiralty Notices to Mariners

should be retained intact. *Whenever reference is made to the Sailing Directions, the Supplement must be consulted.* The existence of a Supplement or Summary of Admiralty Notices to Mariners is to be entered in the tabular form inside the cover of the Sailing Directions.

Admiralty Notices to Mariners affecting Sailing Directions *are not* to be cut up and pasted in, but the book is to be annotated in the margin, or corrected in manuscript, as convenient.

**2. The Admiralty List of Lights, Fog Signals and Visual Time Signals.**—The Admiralty List of Lights, Fog Signals and Visual Time Signals for the world is issued in twelve volumes divided geographically as shown on the index chart at the beginning of each volume.

Light-buoys are *not* included in the list.

The volumes are published annually at the rate of one volume per month commencing with Volume I in January and ending with Volume XII in December. Supplements to these volumes will not be issued.

Each volume will be issued with an inscription on its cover and title page stating the date to which the volume has been corrected which will be approximately six weeks prior to the date of its issue. Permanent and temporary corrections or additions to each volume which may occur between the date of correction and date of issue, will be promulgated by Section III of Admiralty Notices to Mariners.

### AMENDMENTS

Important amendments are promulgated in Admiralty Notices to Mariners. In Section IIIA of each Weekly Complete Edition of these Notices will be found all additions and alterations made to Lights, Fog Signals and Visual Time Signals by the Notices issued during the week affected; certain other additions and alterations are also included in Section IIIA, which, though not of sufficient importance to necessitate the issue of a Notice to Mariners, will be found of use to the seaman. Section IIIB contains similar information but of a temporary character; Section IIIC also contains temporary information but consists of a list of lights and fog signals extinguished or inoperative on account of damage sustained during the war.

Corrections to the Light Lists should be made in pencil, or extracted from Section III and pasted in the appropriate volume.

**NOTE:** Corrections are not made in copies of the Lists of Lights, etc., stocked by the Hydrographic Supplies Establishment, Admiral Chart Agents or the Admiralty Chart Depots, and copies received from these sources should accordingly be corrected from the weekly editions of the Notices to Mariners before being brought into use.

**3. The Admiralty List of Radio Signals.**—The Admiralty List of Radio Signals is issued in three volumes.

**Volume I.—Communications**—Comprises particulars of radiotelegraph coast stations, together with general regulations; it also includes such subsidiary services as medical advice supplied by radio, together with details of the organisation for transmitting British official messages to merchant ships.

**Volume II.—Navigational Aids**—Comprises particulars of services from direction-finding stations and radiobeacons, together with radio time signals and navigational warnings (with ice signals); all relevant codes and regulations will be found in this volume.

**Volume III.—Meteorological Services**—Comprises particulars of

weather services provided for the use of shipping, together with relevant codes and lists of meteorological observation stations.

New editions of each volume will normally be published annually. A supplement to each volume is also issued.

- 5 These Supplements embody corrections subsequent to the date of going to press, and are issued gratis with each volume. All corrections later than those included in the Supplement are promulgated in Section IV of the complete weekly edition of Admiralty Notices to Mariners.
- 10 Copies of the List stocked by the Hydrographic Supplies Establishment, Admiralty Chart Agents or the Admiralty Chart Depôts are not kept corrected, and Lists received from these sources should accordingly be corrected from the Supplements and from the weekly editions of the Admiralty Notices to Mariners before being brought into use.
- 16 **4. The Admiralty Tide Tables.**—The Admiralty Tide Tables are published in three sections as follows:—  
 For “Home Waters (British Isles, Europe and North coast of Africa).”  
 For “Atlantic and Indian Oceans.”  
 20 For “Pacific Ocean and Adjacent Seas.”
- Each section contains two parts, Part I giving tidal predictions for Standard Ports, and tidal stream predictions for certain straits and channels; Part II giving data for predicting tides at places which are not Standard Ports.
- 26 Admiralty Tide Tables Part III, contains instructions for predicting tides and tidal streams, and for analysing observations of tides and tidal streams, with tables to assist prediction and analysis.

#### THE USE OF CHARTS AS NAVIGATIONAL AIDS AND GENERAL REMARKS RELATING TO PRACTICAL NAVIGATION.

- 30 *Reliance on a chart.*—The value of a chart must manifestly depend upon the accuracy of the survey on which it is based, and this becomes more important the larger the scale of the chart.

- To estimate this the date of the survey, which is always given  
 35 in the title, is a good guide. Besides the changes that, in waters where sand or mud prevails, may have taken place since the date of the survey, the earlier surveys were mostly made under circumstances that precluded great accuracy of detail, and, until a plan founded on such a survey is tested, it should be regarded with caution.
- 40 It may, indeed, be said that, except in well-frequented harbours and their approaches, no surveys yet made have been so minute in their examination of the bottom as to make it certain that all dangers have been found. The fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the sound-  
 45 ings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail.

- It appears to be insufficiently realised that the degree of reliance which may reasonably be placed upon an Admiralty chart, even in surveys of modern date, is mainly dependent on the scale on which the  
 60 survey was made. The scale for publication is now generally that of the original survey, except in the case of coast sheets which are sometimes reduced. It should not, therefore be assumed that the original survey was made on a larger scale than that published.

It must be borne in mind that the principal method of ascertaining

the inequality of the bottom of the sea is by the laborious process of sounding, and that in sounding over any area, the boat or vessel obtaining the soundings is kept on given lines; that each time the lead descends, or a sonic sounding is taken, the depth over only a small area is obtained, in the case of the lead, it has a diameter of only a few inches, and that consequently each line of soundings, though miles in length, is only to be considered as representing a narrow width. 5

Surveys are not made on uniform scales, but each survey is made on a scale commensurate with its apparent importance. For instance, a general survey of a coast, which vessels only pass in proceeding from one place to another is not usually made on a scale larger than one inch to the nautical mile, while surveys of areas where vessels are likely to anchor, are made on a scale of three inches to the mile, and surveys of frequented ports or harbours likely to be used by fleets, on a scale of from six inches to ten inches to the nautical mile. 10 15

Close examination by sounding is the only method by which surveys on a large scale can be made, and in view of the vast mileage of surveys yet requiring completion in the interests of navigation, it would be a waste of time to undertake large scale coast surveys. 20

The scale on which a survey is to be conducted having been settled, it is manifestly superfluous to obtain more lines of soundings than can be represented on the paper. 100 soundings, which is the maximum number that can be placed with clearness on every square inch of paper, means that on a scale of one inch to the mile each sounding on the chart occupies an area representing eight acres of actual ground, whilst on a scale of six inches to the mile each sounding represents an area of a little less than a quarter of an acre, i.e., of 100 feet square. 25

The following diagram represents as many soundings as can be placed legibly on a square inch of paper :— 30

16	15	15	13	13	14	12	11	10	9
14	15	14	14	13	13	12	11	9	8
15	15	14	12	16	14	13	10	10	9
16	16	17	18	16	12	11	8	9	10
18	17	15	12	9	7	7	4	9	10
19	16	12	9	5	4	5	4	8	9
22	19	16	10	3	4	5	6	7	8
20	16	12	7	5	6	6	7	8	10
18	15	11	9	7	7	7	8	10	11
20	17	14	11	12	10	9	10	11	13

Little assistance in detecting excrescences on the bottom is afforded by the eye, when sounding in a boat, even in clear weather, on account of the observer being within five feet of the surface; none in turbid seas. If, therefore, there is no inequality in the soundings to cause suspicion, a shoal patch between two lines may occasionally escape detection. 35

Thus, in a chart on a scale of one inch to the mile, an inequality of some acres in extent rising close to the surface, if it happened to be situated between two lines, might escape detection; whilst in a chart on a scale of 6 inches, inequalities as large as battleships, if lying parallel with, and between the lines of soundings, might exist without detection if they rose abruptly from an otherwise even bottom. 40

General coast charts should not, therefore, be looked upon as infallible, and a rocky shore should on no account be approached within the ten-fathom contour line, without taking every pre- 45

caution to avoid a possible danger ; and even with surveys of harbours on a scale of 6 inches to the mile vessels should avoid, if possible, passing over charted inequalities in the ground, as some isolated rocks are so sharp that the lead may not find the highest part. Better results can, however, be obtained by sonic sounding owing to the rapidity with which such soundings can be taken, but even this method will not find rocks unless the boat or vessel be directly over them.

Blank spaces among soundings mean that no soundings have been obtained in these spots. When the surrounding soundings are deep it may with fairness be assumed that in the blanks the water is also deep ; but when they are shallow, or it can be seen from the rest of the chart that reefs or banks are present, such blanks should be regarded with suspicion.

Soundings in hair line, which are shown on the latest charts in upright figures, and on other charts in sloping figures, indicate that such soundings have been taken from smaller scale charts, an unreliable source, or adapted from old and imperfect surveys.

*Fathom lines a caution.*—Except in plans of harbours that have been surveyed in detail, the six-fathom line on most Admiralty charts is to be considered as a caution or danger line against unnecessarily approaching the shore or bank within that line, on account of the possibility of the existence of undiscovered inequalities of the bottom, which nothing but an elaborate detailed survey could reveal. In general surveys of coasts or of little frequented anchorages, the necessities of navigation do not demand the great expenditure of time required for such a detailed survey. It is not contemplated that ships will approach the shore in such localities without taking special precautions.

The ten-fathom line, is on rocky shores, as before mentioned, another warning, especially for ships of deep draught.

Charts on which no fathom lines are marked must be especially regarded with caution, as it generally means that soundings were too scanty and the bottom too uneven to enable them to be drawn with accuracy.

Isolated soundings, shoaler than surrounding depths, should always be avoided as there is no knowing how closely the spot may have been examined.

*Chart on largest scale always to be used.*—It sometimes happens that from press of work, only the copper plate of the larger scale chart of a particular locality can at once receive any extensive re-arrangement of coastline or sounding. This is an additional reason, besides the obvious one of the greater detail shown, why this largest scale chart should always be used for navigating.

*Caution in using small scale charts.*—In approaching the land or dangerous banks, regard must always be had to the scale of the chart used. A small error in laying down a position means only yards on a large-scale chart, whereas on a small scale the same amount of displacement means large fractions of a mile.

For the same reason bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in bearing or in laying it down on the chart has a greater effect in misplacing the position the longer the line to be drawn.

*Graduation.*—All plans are now being graduated in skeleton style before publication in order to facilitate easy reference to

astronomical positions ; previously published plans are also graduated as opportunity offers. The graduation is, however, of necessity often based upon imperfect information of a conflicting nature ; for this reason, whenever an astronomical position is quoted other than approximate (i.e., when seconds are given), it is necessary to quote also the number of the particular chart from which the position has been derived. 6

In this connection it is pointed out that, whenever possible, a position should be transferred from one chart to another by bearing and distance from a distinguishing feature common to both, such as a point of land or a light, &c., and not by the graduation which may differ owing to one of the charts being constructed on later and more complete astronomical data than the other. 10

*Distortion of printed charts.*—The paper on which charts are printed is, from various causes, subject to distortion, but the effect of this is seldom sufficient to affect navigation. It must not, however, be expected that accurate series of angles taken to different points will always exactly agree when carefully plotted upon the chart, especially if the lines are to objects at some distance. The larger the chart the greater the amount of this distortion. 15 20

*Buoys.*—It is manifestly impossible that any reliance can be placed on buoys always maintaining their exact position. Buoys should, therefore, be regarded as warnings and not as infallible navigating marks, especially when in exposed positions ; and a ship should always, when possible, be navigated by bearings of fixed objects on shore or angles between them, and not by buoys. 25

*Light-buoys.*—The lights shown by light-buoys cannot be implicitly relied on, as, if occulting or flashing, the apparatus may get out of order, or the light may be altogether extinguished. These lights in the British isles are from 5 to 217 candle power. 30

*Cable-buoys.*—Cable-buoys marking the ends of submarine cables usually are spherical or can shaped, surmounted by a globe and occasionally a flag. Below the topmark two *white fixed* lights, disposed horizontally, may be exhibited, but they cannot be implicitly relied on. 35

*Lights.*—Arcs drawn on charts round a light are not intended to give information as to the distance at which it can be seen, but solely to indicate, in the case of lights which do not show the same characteristics or colours in all directions, the bearings between which the differences occur. 40

All the distances given in the Admiralty List of Lights and on the charts for the visibility of lights are calculated for a height of an observer's eye of 15 feet. The table of distances visible due to elevation at the beginning of each part of the Admiralty List of Lights, affords a means of ascertaining how much more or less the light is visible should the height of the eye be more or less. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range. Again, refraction may often cause a light to be seen farther than under ordinary circumstances. 45

When looking out for a light at night, the fact is often forgotten that from aloft the range of vision is much increased. By noting a star immediately over the light a very correct bearing may be afterwards obtained from the standard compass. 50

The intrinsic power of a light should always be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen. 55



The power of a light can be estimated by remarking its candle power, as given in the Admiralty List of Lights, and in some cases by noting how much its visibility in clear weather falls short of the range due to the elevation at which it is placed. Thus, a light standing 200 feet above the sea, and only recorded as visible at 10 miles in clear weather, is manifestly of little brilliancy, as its elevation would permit it to be seen over 20 miles, if of any power. (See table in the Admiralty List of Lights.)

The distance from a light cannot be estimated either by its brilliancy or its dimness.

On first making a light from the bridge, by at once lowering the eye several feet and noting whether the light is made to dip it may be determined whether the vessel is in the circle of visibility corresponding with the usual height of the eye or unexpectedly nearer the light.

*Fog signals.*—Sound is conveyed in a very capricious way through the atmosphere. The following points in regard to fog signals should be borne in mind :—

- (a) Fog signals are heard at greatly varying distances.
- (b) Under certain conditions of atmosphere, when an air fog signal is a combination of high and low tones one of the notes may be inaudible.
- (c) There are occasionally areas around a fog signal in which it is wholly inaudible.
- (d) A fog may exist a short distance from a station and not be observable from it, so that the signal may not be sounded.
- (e) Some fog signals cannot be started at a moment's notice after signs of fog have been observed.

Mariners are therefore warned that fog signals cannot be implicitly relied upon, and that *the practice of sounding should never be neglected.*

Particular attention should be given to placing "Look-out men" in positions in which the noises in the ship are least likely to interfere with the hearing of the sound of an air fog signal; as experience shows that, though such a signal may not be heard from the deck or bridge when the engines are moving, it may be heard when the ship is stopped, or from a quiet position. It may sometimes be heard from aloft though not on deck.

Great assistance may be obtained from the radiobeacons at many important lighthouses and light-vessels, but the attention of Mariners is called to the serious dangers which may arise from their misuse. No attempt should be made to approach such a position on a radio bearing, whilst relying only on hearing the sound fog signal in sufficient time to alter course to avoid danger. When the radio fog signal is transmitted from a light-vessel, it is essential in order to avoid collision, that the bearing from the light vessel should not be kept constant.

*Tides.*—In navigating coastal waters where the range of the tide is considerable, caution is always necessary. The tidal predictions for Standard ports in the Admiralty Tide Tables can generally be relied upon to give the times of high and low water to within a few minutes, and heights within a few tenths of a foot. Larger errors are to be expected in the predictions for places which are not Standard ports, computed from the data in Part II, but such predictions computed from the harmonic constants are always sufficiently accurate for the general requirements of navigation. For Standard Ports the heights of the tide at times between high and low water may usually be found within narrow limits in accordance with the instructions in Parts I and III of the Tide Tables.

The datums of Admiralty charts depending on Admiralty surveys vary with the type of tide, but usually conform with the International agreement, that datum should be "a plane so low that the tide will but seldom fall below it." The datums used by different nations, however, differ very considerably and those of Admiralty charts depending on foreign surveys are always those used by the original surveyors, which vary from "lowest possible low water" to "mean low water" in tidal waters, and are usually mean sea level in non-tidal waters. 6

The datum used is always stated on large scale Admiralty charts.

*Caution.*—Most datums are above the lowest level to which the tide may fall; the charts therefore do not always show minimum depths. 10

*Tidal streams.*—Where the tidal streams are semi-diurnal information regarding them is usually given, in a convenient part of the chart, in tabular form or by notes, special symbols being inserted at the positions to which the information refers. In certain cases, where the information available is incomplete, the streams are indicated by means of arrows. 15

There are many places where the tidal streams cannot be predicted by reference to the tide at a Standard Port. Although no data for predicting the times at which they flow is given, their general direction is, in many cases, indicated by arrows on the charts. For a few of the straits and channels, where these conditions exist, tidal stream predictions are given in the Admiralty Tide Tables. 20

Tidal streams, particularly if rotary, may vary considerably both in direction and rate; predictions of the stream must therefore always be considered approximate. 25

The turn of the tidal stream is not usually coincident with the times of high and low water; in fact, though in estuaries, harbour entrances, &c., the stream usually turns at about the times of high and low water, in open channels, and along open coasts generally, the turn usually occurs more nearly at half tide. Predictions of the times of high and low water must therefore never be used as predictions of the times of slack water. 30

It should be remembered that, even where the general direction of the stream is parallel with the shore, an indraught is usually experienced when crossing the entrances to bays and inlets. 35

*Fixing positions.*—For further information on this subject, see Admiralty Manual of Navigation.

When in sight of land, every opportunity should be taken of fixing the ship's position by terrestrial objects. 40

The most usual method is by compass bearings of suitable objects, and it must be borne in mind that a fix by only two bearings is liable to error, either an absolute error in taking the bearings, or those made in applying the deviation or in laying the bearings off on the chart. For these reasons, a third or check bearing of some other object should, when possible, be taken, especially when near the shore or dangers. The intersection of these three lines on the chart will prevent any mistakes if the objects are suitably placed. 45

The most accurate method of fixing a position is by angles between well-defined objects on the chart. All ships are supplied with a station pointer, and this method should be used whenever possible. 50

Two conditions are, however, necessary for its successful employment; first that the objects be well chosen, and, second, that the observer is skilful, and rapid in his use of the sextant and station pointer. For the former, reference can be made to the pamphlet on the use of the station pointer; the latter is only to be obtained by practice. 55

It will readily be seen that the sextant offers great advantages, as angles can be obtained from any position whence the objects are visible.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbours, or narrow passages among mud banks, navigation by sextant and station-pointer is invaluable, as a true position can only be obtained by its means. A small error in either taking or plotting a bearing under such circumstances may put the ship ashore.

In all cases where great accuracy of position is desired, such as the fixing of a rock or shoal, or the addition to a chart of fresh soundings or new buildings, angles should invariably be used. These should be taken to several objects, the more the better, but five objects is a good number, as the four angles thus obtained not only prevent any errors, but also furnish a means of checking the accuracy of the chart itself. When running a line of soundings, it is only necessary to take a third angle now and then; firstly to make certain that the more important soundings, as at the end of a line, are correctly placed, and, secondly, to check the general accuracy of the chart.

Attention is also directed to the very useful and handy method of fixing by the bearing and distance of a suitable object.

Should the ship be supplied with a rangefinder, its use here is obvious, but without one a very good approximate distance of an object of known height may be obtained, by observing its angle of elevation and obtaining the distance from Lecky's Offshore Distance Tables, which are supplied with all sets of charts. Full directions for the use of these Tables are given with them.

Sometimes, when only one of the requisite objects is visible from the standard compass, a compass bearing of it and a sextant angle to the other may be used to fix the position.

The method of fixing by doubling the angle on the bow is useful when passing points of land, &c., in waters where there is either no tidal stream or current, or where this can be estimated with sufficient accuracy. This method is as follows:—

Suppose that the angle between the ship's head and an object is measured, and found to be  $X^\circ$ , and that the time of the observation is noted. Suppose also that the time is again taken when the angle between the ship's head and the object is  $2X^\circ$ . Then, if the course made good is the course steered, the distance of the ship from the object, at the time that the second bearing was taken, is equal to the run (over the ground) in the interval. Hence the ship's position can at once be laid off as a bearing and distance from the object. In practice, the angle  $X^\circ$  should not be less than about  $25^\circ$ .

The most usual form of this method, the so-called "four point bearing," gives an excellent fix for a departure but does not ensure safety, as the point with its outlying dangers is abeam before the position is obtained.

The above fix is only reliable if either there is no tidal stream or current, or if the stream is running directly with or against the course of the ship; if otherwise, or if leeway is to be allowed for, the above method should never be used, but the ship's position should be obtained by plotting the two bearings and the estimated course and distance made good in the interval.

A table "Distance of an object by two bearings," is supplied with certain chart folios, and is also given in Inman's Tables, by which the ship's position at the time of the second bearing can be found; any two bearings at a suitable angle to each other may be used, to-

gether with the run between them, but, again, this table should not be used when the vessel is subject to a cross tidal stream or leeway.

The use of the danger angle in passing outlying dangers with land behind them, should also not be forgotten. A vertical danger angle is useful when the danger lies off an object such as a lighthouse, the height of which is known; the angle being obtained from the afore-  
said Lecky's Tables. If a horizontal danger angle between two  
objects is used, however, caution is necessary, as, should the objects  
not be correctly placed on the chart, the angle taken from it may  
not serve the purpose. This method should not, therefore, be em-  
ployed when the survey is old or manifestly imperfect.

When fixing by astronomical observations, attention is drawn to the great utility of the position line. Even a single position line may at times give invaluable information; as the ship must be somewhere on this line, provided that the chronometer is correct.

A sounding obtained at the same time may often serve to give an approximate position. Again, by steering along, or at a required distance parallel to, a single position line, a vessel may make her port or avoid a danger, although uncertain of her position.

A very accurate position may be obtained by observations of two or more stars at evening or morning twilight, or by the observation of a bright star at daybreak, and another, shortly afterwards, of the sun when a few degrees above the horizon. The position lines obtained from the bodies observed should differ in azimuth by  $30^{\circ}$  or more.

Mariners are also reminded that, with modern tables for correcting the altitude, observations of the moon entail practically no more calculation than those of a planet. Moon sights are sometimes available when stars are obscured by light cloud, &c.; also an excellent position may frequently be obtained by simultaneous observations of the sun and moon.

Great use may be made of radio bearings for fixing the ship, full details of this method, and its limitations, are given in the Admiralty List of Radio Signals.

*Observations for Errors of the Compass.*—No opportunity should be neglected of checking the deviations of the standard compass. When coasting, and a well surveyed and fairly large scale chart is available, an excellent method of observing the deviation is by taking the compass bearing of two suitable objects when in transit, and comparing this with the magnetic bearing from the chart; provided always that the objects are not too close together; also by using any leading lines, the true bearings of which are being indicated in degrees and minutes on the charts, when they are accurately known. When these methods are not available, the deviation should be obtained by azimuths of a heavenly body.

Deviations should be observed on any change of course on which the ship is steadied for any material space of time; if steering a steady course, the compass error should be observed at least twice a day.

*Change of variation of the compass.*—The gradual change in the variation must not be forgotten in laying down positions by bearing on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long the displacement of position from neglect of this change may be of importance. The compasses are re-engraved when the error amounts to a degree, but the chart plates cannot be corrected more

frequently from the impossibility of making alterations often on one spot in a copper plate.

The geographical change in the variation is in some parts of the world sufficiently rapid to need consideration. For instance, in approaching Halifax from Newfoundland the variation changes  $10^{\circ}$  in less than 500 miles, and in the English channel about  $5^{\circ}$  in 400 miles. The Variation chart should be consulted on this head.

On certain general charts embracing large areas with considerable change of variation, true compasses are placed instead of magnetic compasses, the variation being shown by *isogonic lines* (curves of equal magnetic variation), in a similar manner to the Variation chart. One or two *isogonic lines* are also sometimes placed on charts, in addition to the magnetic compasses, in order to indicate the general direction of these curves, and thus facilitate the determination of the variation to be employed in portions of the chart not in immediate proximity to any one of the engraved compasses. Magnetic Variation values shown on Admiralty charts are for the 1st July of the year mentioned.

*Local magnetic disturbance of the compass on board ship.*—The term "local magnetic disturbance" has reference only to the effects on the compass of magnetic masses external to the ship in which it is placed. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places on the globe. Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local centre of magnetic force of an amount absolutely unknown to affect a compass half a mile distant. Such deflections of the compass are due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow, and the force strong, the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centres near together.

They may also be due to wrecks lying on the bottom in moderate depths, but investigations have proved that, while deflections of unpredictable amount may be expected when very close to such wrecks, it is unlikely that deflections in excess of  $7^{\circ}$  will be experienced, nor should the disturbance be felt beyond a distance of 250 yards.

It is very desirable that whenever a ship passes over an area of local magnetic disturbance, the position should be fixed, and the facts reported as far as they can be ascertained.

*Use of oil for modifying the effect of breaking waves.*—Many experiences of late years have shown that the utility of oil for this purpose is undoubted, and the application simple.

The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil, skillfully applied, may prevent much damage both to ships (especially the smaller classes) and to boats, by modifying the action of breaking seas.

The principal facts as to the use of oil are as follows:—

1. On free waves, i.e., waves in deep water, the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances; but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing

else is obtainable ; but all animal and vegetable oils, such as waste oil from the engines, have great effect.

4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.

5. It is useful in a ship or boat, both when running, or lying to, or in wearing. 5

6. No experiences are related of its use when hoisting a boat up in a sea-way at sea, but it is highly probable that much time and injury to the boat would be saved by its application on such occasions.

At anchor, when the sea is sufficient to render it difficult to hoist up or in boats, oil bags from forward or from the swinging booms have been found to render the sea alongside comparatively smooth. 10

7. In cold water, the oil, being thickened by the lower temperature, and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used. 15

8. The best method of application in a ship at sea appears to be : hanging over the side, in such a manner as to be in the water, small canvas bags, capable of holding from one to two gallons of oil, such bags being pricked with a sail needle to facilitate leakage of the oil. 20

The position of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—e.g., from the cathead—and allowed to tow in the water.

With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up 25 on the quarter.

Lying to, the weather bow and another position farther aft seem the best places from which to hang the bags, with a sufficient length of line to permit them to draw to windward, while the ship drifts.

9. Crossing a bar with a flood tide, oil poured overboard and 30 allowed to float in ahead of the boat which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances the effect cannot be so much trusted.

On a bar with the ebb tide it would seem to be useless to try oil for the purpose of entering. 35

10. For boarding a wreck, it is recommended to pour oil overboard to windward of her before going alongside. The effect in this case must greatly depend upon the set of the current, and the depth of the water.

11. For a boat riding in bad weather from a sea anchor, it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil is diffused well ahead of the boat, and the bag can be readily hauled on board for refilling if necessary.

12. Towing a vessel in a heavy sea, oil is of the greatest service, 45 and may prevent parting the hawser. Distribute from the towing vessel forward and on both sides ; if used only aft the tow alone gets the benefit.

*Tropical revolving storms, and practical rules for avoiding them.—*

1. Tropical revolving storms or cyclones occur for the most part 50 in the tropical or sub-tropical portions of the western sides of the great oceans, with the exception of the South Atlantic ocean where they are unknown. They occur also on the eastern sides of the North Pacific and South Indian oceans, in the Arabian sea and the Bay of Bengal.

2. Revolving storms are so named because the wind in these storms 55 revolves round an area of low pressure situated in the centre. The

direction of revolution is anti-clockwise in the northern hemisphere and clockwise in the southern hemisphere. The wind, however, does not revolve round the centre of low pressure in concentric circles but has a spiral movement inwards, towards the centre.

5 3. Tropical storms are known by various names according to the locality in which they are experienced. In the West Indies, on the Pacific coast of Central America and in the South Pacific ocean they are called hurricanes: in the Indian ocean, Arabian sea and Bay of Bengal, cyclones: and in the western part of the North Pacific, 10 typhoons.

4. These storms generally originate between the parallels of 5° and 20° of latitude in both hemispheres and as a rule have initially a progressive movement westward, subsequently recurving towards the pole of the hemisphere in which they are generated. Thereafter, 15 they tend to move north-eastward in the northern hemisphere and south-eastward in the southern hemisphere, so that they invade the temperate latitudes where they may gradually acquire the characteristics of the depressions of such latitudes.

5. Tropical storms are most frequent towards the end of the hot 20 season in both hemispheres. In the Arabian sea and Bay of Bengal, however, they have their maximum frequency and are most dangerous during the transition periods at the beginning and end of the monsoon.

6. The diameter of revolving storms may vary from twenty to some 25 hundreds of miles. Their average rate of progress when moving westward is about 10 knots, but after recurving their average speed increases to about 20 knots. It should be remembered, however, that very great variations from these speeds are likely to occur, and especially after recurving the storms sometimes move very quickly, 30 their rate of travel then occasionally being as much as 50 knots.

7. The winds associated with tropical storms are extremely violent, but in the centre, or eye of the storm, light variable breezes or squalls alternating with complete calms are usually encountered. In this region mountainous seas and a heavy confused swell are experienced. 35 Just outside the central region the strongest winds of the storm system are met, accompanied by violent squalls, and in this area, in well developed storms, it is possible that a wind speed of 150 knots in gusts may be attained. With increasing distance from the storm centre the wind generally decreases progressively. The aim of the 40 seaman should therefore be to remain as far as possible from the centre of the storm system.

8. The track followed by the centre of the storm is known as the path of the storm, and the portion of the storm field on the right of the path is called the right semi-circle, and that on the left, the left 45 semi-circle.

9. The semi-circle which lies on the side of the path towards the usual direction or recurvature, i.e., the right semi-circle in the northern hemisphere and the left semi-circle in the southern hemisphere, is known as the dangerous semi-circle. It is so called because a ship 50 caught in it may be blown towards the path over which the centre will pass, or the storm may recurve and the centre pass over her.

10. The semi-circle which lies on the side of the path away from the usual direction of recurvature is known as the navigable semi-circle. A ship situated within this semi-circle will tend to be blown 55 away from the path of the storm centre and the recurvature of the storm will increase her distance from the centre.

11. The indications of the approach of a tropical storm are :—
  - (a) A swell not caused by the wind then blowing.
  - (b) A fall in the barometer which may be divided into three phases :—
    - (i) A slow fall during which the diurnal variation is still 5  
apparent, and which usually occurs from 500 to 120 miles  
from the centre of the storm.
    - (ii) A distinct fall during which the diurnal variation is  
almost completely masked and which usually occurs from 120 to 50 miles from the centre. 10
    - (iii) A rapid fall usually occurs from 60 to 10 miles from  
the centre.
  - (c) The reading of the barometer being 2 to 3 mb. below the  
normal for the time of the year is a probable indication of  
the formation of a tropical storm in the vicinity. 15
  - (d) An appreciable change in force and/or direction of the wind.
  - (e) The formation of convergent streaks or bands of cirrus cloud.
  - (f) An ugly threatening appearance of the sky, and lurid sky  
colourings at sunrise and sunset.
12. In order to judge the best way to act if there is reason to 20  
suppose a storm is in the vicinity, a seaman requires to know :—
  - (a) the bearing of the centre of the storm ;
  - (b) the path of the centre ;
  - (c) the semi-circle in which the ship is situated.
13. If an observer faces the wind, the centre of the storm will be 25  
from 12 to 8 points on his right-hand side in the northern hemisphere,  
and on his left in the southern hemisphere ; 12 points at the beginning  
of a storm, gradually decreasing to 8 points towards the centre.
14. The path of the storm centre can be approximately deter-  
mined by taking two such bearings with an interval of from two to 30  
three hours between observations, provided that there has been a wind  
shift during the interval and that allowance is made for the ship's  
movement. It can, however, be assumed that the storm is not travel-  
ling in a southerly direction, if in the northern hemisphere, or in a 35  
northerly direction if in the southern hemisphere ; and if in a lower  
latitude than 15° its path is most unlikely to have an easterly com-  
ponent, except in the South Pacific eastward of the 180th meridian.
15. If the wind shifts to the right the vessel is in the right semi-  
circle, if to the left in the left semi-circle ; if the wind is steady in  
direction but increasing in force, she is in the direct path of the storm. 40
16. A further check on the bearing and path of the storm may  
often be obtained by noting the direction from which the swell is  
coming and any change in this direction. The swell usually travels  
directly outwards from the storm centre.
17. If in the dangerous semi-circle, i.e., the right semi-circle in 45  
the northern hemisphere and the left semi-circle in the southern  
hemisphere, a steam vessel should steer to windward away from  
the assumed path of the storm, or stop and lie to if there is insufficient  
sea room.
- A sailing vessel should heave to, on the starboard tack in the 50  
northern hemisphere and on the port tack in the southern hemisphere.
18. If the seaman has reason to believe that his vessel is in the direct  
path of the storm, or if in the navigable semi-circle (i.e., the left  
semi-circle in the northern hemisphere and the right semi-circle in  
the southern hemisphere), he should run with the wind on the star- 55  
board quarter in the northern hemisphere and on the port quarter



in the southern hemisphere, away from the assumed path of the storm until the barometer begins to rise.

19. Sometimes a tropical storm moves so slowly that a vessel, if ahead of it, can easily outpace it, and if astern of it, can overtake it.

- 5 Since, however, she is unlikely to feel seriously the effects of a storm known to be in the vicinity so long as the barometer does not fall below 1005 millibars, it is recommended that frequent readings of the barometer should be made and that the vessel should continue on her course until the barometer falls to 1005 millibars or the wind increases to  
10 force 6. If and when either of these events occurs, she should act as described in the preceding paragraphs until the barometer has risen to 1005 millibars or the wind decreased to force 6 or less. Should it be certain, however, that the vessel is behind the storm, or in the navigable  
15 semi-circle, it will evidently be sufficient to alter course away from the centre.

20. If there is insufficient room to run when in the navigable semi-circle, a steam vessel should stop and lie to, and a sailing vessel should heave to on the port tack in the northern and on the starboard tack in the southern hemisphere.

- 20 21. If in harbour, or at anchor, a seaman should be just as careful in watching the signs and ascertaining the probable path of the storm centre, as he may be able to point his ship, or shift his berth with advantage.

22. In regions where tropical storms are encountered the local  
25 meteorological services issue special warning messages by radio during the storm season giving particulars of the position and probable path of any storm which is in the vicinity. Particulars of these messages are given in the Admiralty List of Radio Signals.

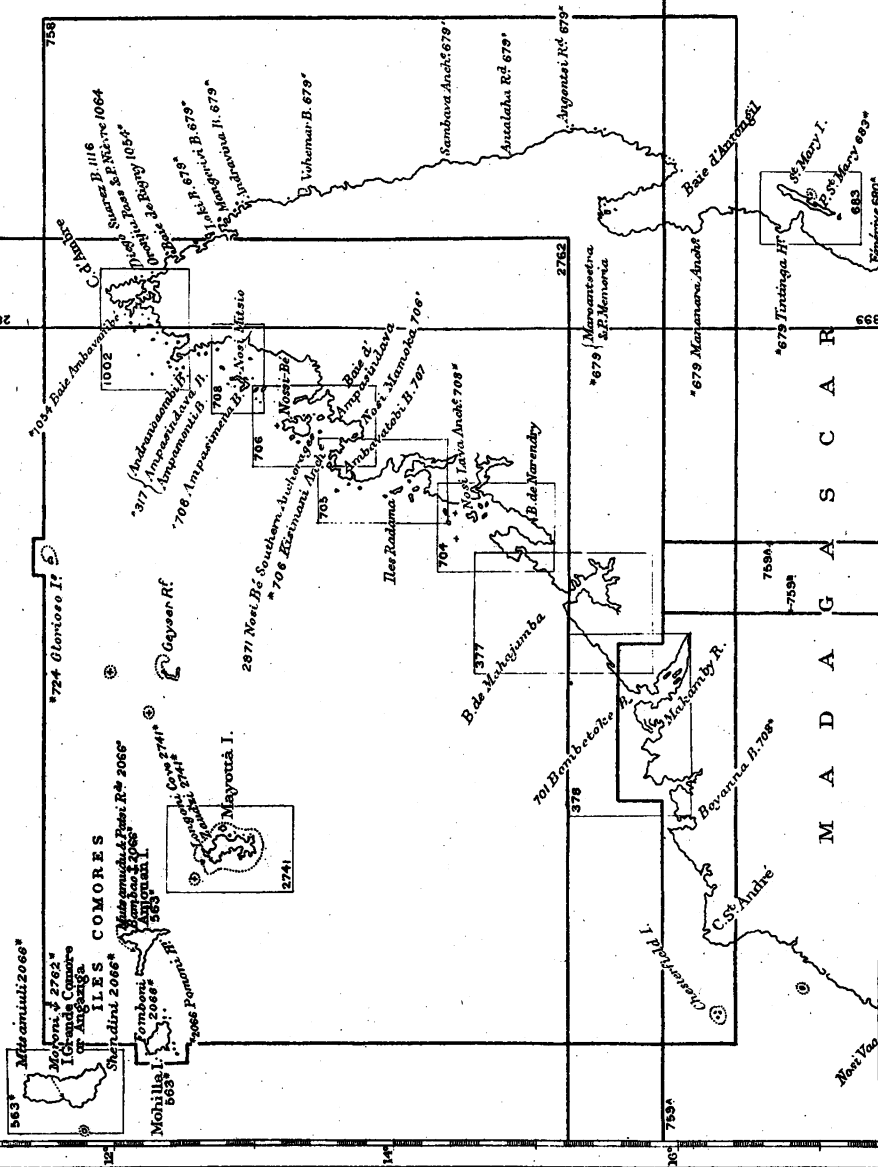


**ALLUDED TO IN THIS WORK**

A number against a place thus :-  
Hombosko R. 701 shows that a separate  
plan is published bearing that number.  
A star and a number thus Arjowan 563  
indicates that a plan of Arjowan I. is  
published on sheet 563.  
For details of scales, prices &c. see  
Administrative Catalogue.

**NOTE**

*The Charts & Plans shown on this Index represent those published at the date given at the foot. They are liable to alteration and amendment.*



Longitude 48° East from Greenwich

August 1940.

### South Indian Ocean Pilot





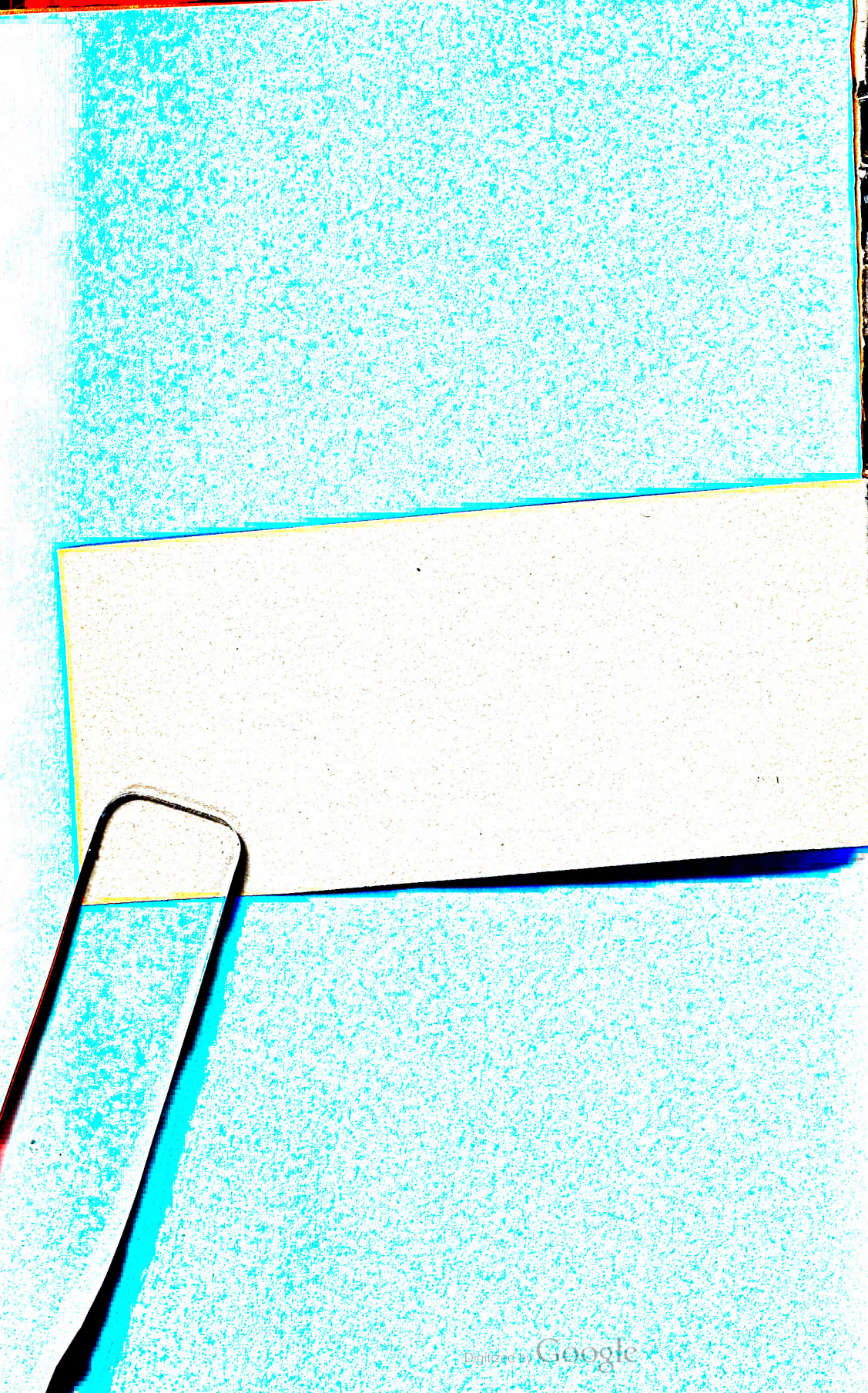
## IMPORTANT.

Details of Lights, Fog Signals, and Time Signals (visual) are not included in this volume; for this information the Admiralty List of Lights, Part X, should be consulted.

Information regarding Vertical Movement of the Water is not included; for this the Admiralty Tide Tables should be consulted.

Details of W/T information (weather bulletins, storm and navigational warnings, time signals, fog signals, and D.F. stations) are not included; for this information the Admiralty List of Radio Signals should be consulted.





# SOUTH INDIAN OCEAN PILOT

## CHAPTER I

ISLANDS AND GROUPS—CURRENTS—ICE—MISCELLANEOUS INFORMATION  
—REGULATIONS—COMMUNICATIONS—AIR LIGHTS—RADIO STATIONS—  
SIGNALS—APPROACHING SQUADRONS OR AIRCRAFT CARRIERS—PASSAGES  
—METEOROLOGY

*Charts 748a, b.*

**PRINCIPAL ISLANDS AND GROUPS.**—The Southern Indian Ocean westward of long.  $80^{\circ}$  E., and northward of lat.  $40^{\circ}$  S., contains the following principal islands and groups:—Madagascar, said to be the fourth largest island in the world; north-eastward and eastward of Madagascar, lying within about 750 miles, are the Amirante and Seychelles groups, Saya de Malha bank, the Cargados Carajos group, Ile de la Réunion, and the islands of Mauritius and Rodriguez; nearer the northern end of Madagascar, and within these outer islands, are the Farquhar and other smaller groups, and in the northern entrance to the Mozambique channel are the Iles Comores. 5 10

Nearly 1,000 miles eastward of the Seychelles group, between the parallels  $4^{\circ} 44'$  and  $7^{\circ} 39'$  S., and the meridians  $70^{\circ} 50'$  and  $72^{\circ} 47'$  E., is the group of islands and coral reefs comprising the Chagos archipelago; this group, with nearly the whole of Madagascar, and all the islands and groups previously mentioned, lie within the Tropic of Capricorn. 15

Farther southward, between the parallels of about  $37^{\circ} 50'$  and  $38^{\circ} 50'$  S., in long.  $77^{\circ} 30'$  E., and in the track of sailing vessels bound to Australia or to the Straits of Sunda, are the precipitous Ile Saint-Amsterdam and Ile Saint-Paul. 20

**CORAL ISLANDS AND REEFS.**—Coral formations being very prevalent in the Indian Ocean, it may be useful to give shortly the names and peculiarities of the various forms of coral structure as usually understood. 25

An atoll may comprise one or any greater number of coral islands of little height, situated on a strip or ring of coral surrounding a central lagoon. Many atolls have passages through this ring of sufficient depth to admit ships to a secure sheltered anchorage within. In others, the passages will scarcely admit boats, and in others the ring is without an opening. A small atoll on the edge of a larger one 30

B



*Charts 748a, b.*

is termed an atollon. Most of the islands in the Pacific Ocean are of atoll formation, as are also many of those in the Indian Ocean, especially in the Laccadive, Maldivé, and Chagos groups.

- 5 A barrier reef may front a coastline, or encircle an island or group of islands, leaving a deep channel between it and the coast. The Great Barrier reef of Australia is an example of the former, and that surrounding the island of Tahiti, in the Pacific, of the latter. Barrier reefs thus form natural breakwaters, with passages through them, frequently leading into good harbours; these passages are generally found opposite valleys in the land, sheltered by the reef. Tidal streams and currents are generally strong and uncertain in these barrier openings.

- A coastal reef is a coral reef extending from the coast, seldom very far, but with little water over it, and no ship passage between it and the land. As the seaward face of these reefs is generally the highest part, on some of them the tide becomes more or less impounded, facilitating navigation by canoes or boats at low water in the narrow passages which generally exist. A coastline with a fringing reef has frequently a barrier reef also, with a deep passage between the two. Madagascar has examples of barrier reefs and still more frequently of coastal reefs. Of the latter, perhaps Rodriguez island is as good a sample as any island in the Indian Ocean.

- Navigation amongst coral reefs.**—As successful navigation amongst coral reefs depends largely upon the eye, it is well to name the conditions under which reefs are most easily seen:—Thus, they are always more plainly visible from the masthead than from the deck or bridge, and when the sun is high rather than low; as also, with the sun behind the observer rather than facing it. With the sea glassy, calm, it is extremely difficult to distinguish reefs.

- The best conditions, therefore, are, with the sun high and behind the observer, and the sea ruffled by a pleasant breeze. Banks, with depths of about 3 feet (0<sup>m</sup>9) over them, then appear of a light brownish colour; those, with a depth of a fathom (1<sup>m</sup>8) or more over them, of a clear green, deepening to a darker green as the depths increase, and finally to a deep blue when out of soundings.

- Under favourable circumstances, a bank, with depths of 3 or 4 fathoms (5<sup>m</sup>5 or 7<sup>m</sup>3) over it, can be seen from aloft at a good distance; but where, and in proportion as, the depths increase beyond this, the bottom will only be seen when nearly over it.

*Chart 748b.*

- SEYCHELLES GROUP.**—The principal group first appears on a Portuguese chart of 1501; they were visited, in 1505, by the Portuguese Commander Dom Pedro Mascaregnas, who gave them the name of Sete Hermanos (Seven brothers), but no important settlement was made on them till the year 1743, when Mahé de Labourdonnais, the then French Governor of Mauritius, sent an expedition to take possession in the name of the King of France, and gave the name of Bourdonnais to the group collectively, while the larger island was called Mahé; the principal islands were colonised by the French, in 1744, but the name of the group was changed, in 1756, to Seychelles, after the French Minister, Vicomte Moreau des Seychelles, the largest island still retaining the name of Mahé. The islands were captured by the British, in 1810, and finally assigned to Great Britain by treaty, in 1814.
- 55 Previous to the French occupation these islands were the resort of

*Chart 748b.*

pirates who infested the Indian ocean, some of whose names are borne by descendants in Mahé at the present time (1932).

The main group of islands are of rugged granite formation and lie on the centre of a bank which is about 12,000 miles square. They were visited, in 1934, by the John Murray Scientific Expedition to the Indian ocean in the Egyptian survey vessel *Mabahiss*, under the direction of Colonel Seymour Sewell, I.M.S., Sc.D. In the report of this expedition the results of the soundings and observations taken point to the fact that the Seychelles islands are peaks on the middle of a great submerged bank, which may once have been part of a southern continent, the continent of Gondwanaland, or Lemuria as it is sometimes called, which was supposed to connect India with Madagascar and South Africa and which went down after a tremendous volcanic upheaval when the lost continent began to subside 10,000 years ago.

The principal islands of this group are high and volcanic, but they are surrounded by very extensive coral reefs and islets. Victoria, in Mahé, is the principal town, and is the seat of the Government for the whole colony.

The climate of Seychelles, generally from their position, is equable, and is the healthiest of any British possession within the tropics.

**Government.**—The Group is administered by the Governor, with an Executive Council consisting of three official members and one unofficial member, and a Legislative Council consisting of three official and three unofficial members.

**Dependencies.**—The colony includes the Amirante isles; Ile Desroches; Alphonse, Bijoutier, and St. Francois islands; Coetivy island; Aldabra islands; Assumption island; the Cosmoledo group; Astove island; St. Pierre, Providence, and Cerf islands; and the Farquhar group.

**Flora.**—The extensive planting of coconut palms throughout the colony has almost completely displaced (1934) the indigenous flora, which is now practically non-existent in a virgin state.

The indigenous species are divided into :—

(1) Marine plants; 8 species of which 5 are cosmopolitan.

(2) Strand or littoral plants; 54 species chiefly of Indo-Malayan origin.

(3) Inland plants; 171 species, chiefly of Asiatic origin.

The rain forest trees, which formed the primitive vegetation, consist almost entirely of genera of Asiatic origin. *Capucin* (*Northea*), *Bois de Fer* (*Vateriopsis*), *Bois rouge* (*Wormia*), *Bois Montagne* (*Campnosperma*) and *Vacoa* (*Pandanus*). The double coconut or *Coco-de-Mer* *Lodoicea Seychellarum* is found in its wild state in the islands of the Praslin group; the preservation of this interesting palm is assured by the establishment of a government reserve, where, in 1934, hundreds of these palms were growing in their natural habitat.

**Population.**—The population, on December 31, 1940, was estimated to be 32,150. The population consists mainly of French Creoles. French and Creole (a corrupt *patois*) are spoken everywhere in the islands. English is practically confined to Government officials and the English inhabitants.

**Products.—Trade.**—The principal products of the colony are coconuts, cinnamon, patchouli and other essential oils.

The coconut industry is the principal one in the colony.

The principal imports are rice, sugar, cotton piece goods, and flour. The principal exports are copra, cinnamon leaf oil, guano, and vanilla.

*Chart 748b.*

**Communication.**—There is a postal service. About 50 miles of cart road and 40 miles of bridle path exist in Mahé island, on Praslin island there are about 20 miles, and in La Digue 9 miles of roads and 5 bridle paths. For details of steamer communication and telegraph cables, *see* page 25.

**Shipping.**—In 1939, shipping with an aggregate tonnage of 336,941 entered Port Victoria.

**Currency.**—The monetary unit is the Indian silver rupee of 100 cents. Silver coins of 50 cents, 25 cents, 20 cents, and 10 cents; also bronze coins of 5 cents, 2 cents, and one cent, are in circulation. Notes are issued by the Government of the following values :—Rs. 50, Rs. 10, Rs. 5, one rupee and one half rupee.

**Weights and measures.**—The metric system of weights and 15 measures is in force.

**Time.**—The standard time of the meridian of 60° 00' E., or 4 hours fast of Greenwich mean time, is adopted in the Seychelles and its dependencies.

**MADAGASCAR.**—Madagascar has been a French colony since 20 1896. Its area is about 241,000 square miles, or not quite four times the extent of England and Wales. It is separated from Africa by the Mozambique channel.

Madagascar was known to the Arabs at a very early period, and mentioned by their writers in the twelfth and thirteenth centuries. 25 It was first made known to modern Europe by Marco Polo, in the latter part of the thirteenth century, under the name of *Magaster*. From 1506 to 1531 various parts were visited by Lorenzo Almeida, Fernando Soares, Joao Gomez d'Abreu, and others. The Portuguese gave it the name of San Lorenzo, and the English for many years called 30 it St. Lawrence.

The Portuguese made no lengthened occupation of any part; early in the sixteenth century they built a fort at the south-eastern end of the island, but its occupants were massacred. In 1595, the Dutch had a settlement which they abandoned three years later on account 35 of the climate. At the time of Henry IV (1589-1610) the French named it Ile Dauphiné.

In 1642, a French East India Company was formed; they took possession of the islands Bourbon, now Ile de la Réunion, and of Diego de Rois, or Rais, now Rodriguez island; they also made settlements on 40 Ile Sainte-Marie, at Baie d'Antongil, and at Baie de Sainte-Luce. On account of fever the latter was abandoned a year later in favour of Fort Dauphin.

In 1645, William Courteen, an English shipowner, formed a colony at Baie de Saint-Augustin, the chief being John Smart, but it was 45 abandoned, in 1646.

About 1724, pirates who had infested the Indian ocean, being closely pressed by the vessels of war of all European powers, formed a settlement on Ile Sainte-Marie until driven away.

In 1774, the French, under Count Benyowski, established the colony 50 of Louisbourg at the inner part of Baie d'Antongil, which lasted for two years only. Many years prior to 1792, the French had a post, as a commercial agency, at Foulpointe, but it failed, and, in 1807, another French settlement, being made at the same place, all died of fever. In 1815, a party of Englishmen from Mauritius established themselves at 55 Baie de Loky by consent of the chiefs, but in consequence of the super-

*Chart 748b.*

intendant striking a chief the whole party were killed by his order, and he (the chief) was executed by other chiefs. Another party from Mauritius was well received and granted a large tract of land. Tamatave was captured by the English from the French, in 1811; the garrison, however, died of fever, and the place was abandoned. 5

Madagascar remained under native sovereignty until the year 1840, in which year the natives of the northern province placed themselves under French protection, owing to the amount of cruelty displayed to them by the reigning Queen; Nossi-Bé was then ceded, and thenceforward became a French possession. 10

The differences between the native government of the island and the French gradually became acute, until in the year 1894 an ultimatum was delivered by the French Government, and on its refusal an expeditionary force of 15,000 men landed at Majunga, and occupied the capital, Tananarive (Antananarivo), on 30th September, 1895; the next day a treaty was signed admitting all the French claims. A protectorate was established, but, in 1896, the island was declared a French colony, and on 27th February, 1897, the native Queen was called on to resign and removed to Ile de la Réunion. 20

Madagascar remains a French colony; it is administered by a governor-general, and is divided into districts.

Madagascar is very mountainous. In the interior is a plateau, about 2,600 feet (792<sup>m</sup>5) high, extending for some 165 miles; the highest point attaining an elevation of 9,150 feet (2788<sup>m</sup>9). The eastern slope is narrow but increases in width from south to north. The western slope is nearly three times as broad. 25

There are numerous water courses, some of which become torrents in the rainy season, but which are normally low. The most important rivers are on the western side of the island. Impassable rapids divide most of the rivers into navigable reaches of short extent. 30

With the exception of the neighbourhood of Fort Dauphin and some parts of the north-eastern side of the island, the eastern side is generally flat and very often low and marshy, broken here and there by sand dunes. Within the coast appear wooded mountains, hills, and plains, part of which are cultivated. 35

The western side of the island is deeply indented, and contains, especially in its north-western part, some important bays. The south-western coast is sandy and arid.

Southward of a line joining Tamatave and Cap Saint-André, that is to say about three-quarters of the island, neither coast affords good anchorage, only open roadsteads, with the exception of Tuléar. 40

**Population.**—The population is mostly composed of Hovas and Betsiléos, who inhabit the central plateau; Sakalaves occupying the western part of the island, and Betsimaraka inhabiting the area bordering the eastern coast and the eastern forest belt. 45

In 1936, the population, including that of Iles Comores, numbered 3,797,936, of whom 3,758,338 were Malagasy, 25,255 were French, and 14,343 foreigners, including Europeans and others.

The capital, Tananarive had a population, in 1936, of 126,515, of which 2,955 were French and 1,080 were foreigners; other important towns are Diégo-Suarez, Tamatave, Majunga, Tuléar, Fianarantsoa, Fort Dauphin, and Hellville. 50

**Products and industries.**—The mineral resources of Madagascar are considerable, phosphates and precious stones being the most important; gold, rock crystal, agate, and corundum are also produced. 55

*Chart 748b.*

The principal crops are rice, sugar-cane, coffee, manioc, maize, cacao, vanilla, tobacco, butter beans, lima beans, and cloves.

The forests contain many valuable woods, while caoutchouc, gum, resins, and plants for tanning, dyeing, and medicinal purposes abound.

Cattle breeding and agriculture are the chief occupations of the natives.

Silk and cotton weaving are carried on, metal working, and the making of straw hats. The preparation of sugar, rice, soap, tapioca, etc., is being undertaken by Europeans, as well as the canning of meat. There are meat-preserving factories.

**Communications.**—Four railways were working, in 1938, in Madagascar, viz., between Tananarive and Tamatave, between Tananarive and Antsirabé, Moramanga to Lac Alaotra, and Fianarantsoa to Mahanara.

Roads fit for vehicles run from Diégo-Suarez to Maevatanana and Tananarive; Tananarive to Tamatave; Tananarive to Majunga; Tananarive to Antsirabé, Fianarantsoa, Josy, Tuléar, and Fort Dauphin; Antsirabé to Mananjary (Mananzhari).

The most navigable waterways are, on the eastern side, the rivers Mahanero, Bemarivo, Sambava, Lokolo, Sahave, Lohotra, Sahantsio, Massoro, and Sakalone; and the Pangalanes canal, which connects Ivondrona, the terminus of a light railway from Tamatave, with Andevorante and Brickaville. On the western side the Betsiboka and its tributaries, the Mangoka, and Onilahy; the canal from Nameld to Demoka, and the Hellot canal at Morondava.

Two air lines serve the interior of the island, but for mails only.

There are telegraph and telephone services throughout the island.

For details of steamer communication and telegraph cables, see page 25, and for a list of the coastal radio stations in the area covered by this volume see page 26.

**Dependencies.**—The dependencies of Madagascar, described in this volume, are Bassas da India, Chesterfield islet, Ile Amsterdam, Ile Europa, Ile Juan de Nova, Ile Saint-Paul, Ile Sainte-Marie, Iles Comores, Iles Glorieuses, and Nossi-Bé.

**Currency.**—The only legal currency in Madagascar is that issued by the Bank of Madagascar.

**Weights and measures.**—The metric system of weights and measures are in force in Madagascar and its dependencies.

**Time.**—Madagascar keeps time of the meridian of 45° 00' E., or 3 hours fast of Greenwich mean time.

*Chart 2899.*

**MAURITIUS.**—Mauritius, with an area of about 720 square miles, is the principal British possession in the Southern Indian Ocean; Port Louis is the capital of the island.

Mauritius was known to Arab navigators at an early date, probably not later than the tenth century. It was no doubt visited by Malays in the fifteenth century, and was discovered by the Portuguese between 1507 and 1512, but the Dutch, in 1598, were the first settlers. In 1710, the Dutch abandoned the island, and it was occupied, in 1715, by the French. In 1810, the British occupied the island, and it was formally ceded to Great Britain by the Treaty of Paris of 1814.

## Chart 2899.

The existing laws are based on the *Code Napoléon*, with such modifications as have been found necessary, and are administered by a Governor; an executive council of four official and two unofficial members; and a legislative council of 27 members, of whom eight are ex-officio, nine are nominated by the Governor, and 10 by the nine districts, of which that of Port Louis returns two; the others nominate one each. 5

The nine districts into which the island is divided are: Port Louis, Pamplemousses, Rivière du Rempart, Flacq, Grand Port, Savanne, 10 Moka, Plaines Wilhems, and Black River. The only elective municipality in the island is that of Port Louis. Government support is given equally to the Roman Catholic church, the Church of England, and the Church of Scotland; but of the Christian inhabitants by far the larger portion are Roman Catholics. 15

**Population.**—On December 31st, 1941, the estimated population of the colony was 408,392; a large number of the above amount consist of the descendants of Indian immigrants, both Hindoo and Muhammadan. There is also a considerable section of Chinese, mostly merchants and shop-keepers. The remainder of the population are mainly of French 20 or of mixed descent, and are chiefly French in habits and customs. English is the language used in the courts of law, French for trade and general purposes by the educated classes, and a creole *patois*, based on French, is spoken by the lower orders. 25

**Flora.**—When first occupied by the Dutch, Mauritius was almost 25 completely covered by forests, which have since been cut down, chiefly to make room for sugar-cane cultivation, until now they occupy a comparatively small area in the higher levels of the island; the area, in 1934, under virgin forest, and that re-afforested, comprise together about 20 per cent. of the total area of the island. 30

Among the many indigenous trees are the *Imbricaria maxima*, *Labourdonnaisia calophylloides*, *L. glauca*, *Terminalia mauritiana*, *Eugenia Glomerata*, *Memecylon angulatum*, *Diospyrus tessellani*, *Imbricaria petiolaris*, and *Erythroxylon laurifolium*.

The introduced forest trees include species of *Eucalyptus* *Pinus*, 35 *Cyptomeria*, and *Casuarina*, in addition to many others. The coast line is fringed chiefly by *Casuarina equisetifolia*.

The forests are being invaded by shrubs such as *Adisia crenulata*, *Ligustrum walkeri* (Privet), and *Rubus moluccanus* (*Framboise marron*). 40

The cultivated plants include chiefly the sugar cane (*Saccharum*), tobacco (*Nicotiana tabacum*), pineapple (*Ananas sativus*), and maize (*Zea mays*).

In the drier parts of the island, near the coast, *Furcraea gigantea* flourishes. 45

Introduced fruit trees such as *Litchi* (*Nephelium Litchi*), Longan (*N. Longana*), Coconut (*Cocos nucifera*), Mango (*Mangifera indica*), and Rose-apple (*Eugenia Jambosa*), amongst others thrive.

Lawn and fodder grasses, which grow luxuriously, include *Panicum maximum*, *Pennisetum purpureum*, *Digitaria*, *Paspalum*, and *Stenotaphrum dimidiatum*.

The introduced shrubs *Lantana camara*, *Cordia interrupta*, and *Opuntia* quickly invade abandoned land, and may be difficult to eradicate, the last mentioned chiefly in the dry coastal areas.

**Fauna.**—The original fauna of Mauritius is now almost extinct 55 except in the case of insects, reptiles, shells, and a few birds.



## Chart 2899.

Among the extinct fauna are the Clumsy Dodo (*Didus ineptus*), the *Aphanapteryx*, a red hen with a snipe beak *A. braeckii*, the gigantic land tortoise *Testudo indica*, *T. sauzei*, a parrot *Lophopsittacus mauritianus*, a scop *Scops commerconi*, an owl *Strix sauzei*, a wild duck *Anas theodori*, a teal *Sarcidionis mauritianus*, a grebe *Podiceps*, and a large lizard *Didosaurus mauritianus*.

There are no indigenous mammalia in Mauritius except bats, *Pteropus edwardii*, *P. rubricollis*, and *P. vulgaris*. The monkey *Macacus cynomolgus*, was introduced from Ceylon, the edible hedge hog (*Centetes ecaudatus*) from Madagascar, the mongoose (*Herpestes griseus*) from India, the deer (*Cervus hippelaphus*) from Sumatra, and the hare (*Lepus nigricollis*) most probably from India.

There exists no reptile or insect dangerous to human beings. Two small harmless snakes were introduced from India, *Typhlops braminus* and *Lycodon aulicum*. Other species of reptiles are an inguana from Ile de la Réunion, *Calotes versicolor*, and two indigenous scinks and hemidactyls.

Some indigenous birds such as the Cato (*Paleornis eques*) and the Pigeon des Mares (*Nosaenas mayeri*) are very likely to become extinct, whilst the ornithological fauna has been increased by the introduction of numerous birds, of which some like the Minah or Martin (*Acridotheres tristis*) have been useful for the control of the locust (*Nomodacris septemfasciata*), whilst the introduction of the Bull-bull (*Otocompsa emeria*) has been disastrous to agriculture.

The insect fauna is very rich in indigenous as well as imported species. In the former group Coleoptera such as *Cratopus* and *Sponsor* are particularly well known, whilst the exotic species comprise some insect pests such as *Phytalus smithi* imported from Barbados, and three species of Moth borers, *Diatraea venosata*, *Sesamia vutieria*, and *Grapholita schistaceana*; the former most probably comes from Ceylon and the two latter from India.

The shell fauna is very rich.

**Products.**—The soils consist, generally, of red clays and laterite, the former being comparatively rich in plant nutrients, whilst the latter become more and more impoverished with increasing rainfall. They produce most of the tropical trees and herbs.

The fruits include the tamarind, mango, banana, guava, shaddock, fig, avocado pear, litchi, custard apple, and mabolo. The pine-apple thrives under cultivation.

The industries of the colony are, almost exclusively, agricultural, and sugar forms over 98 per cent. of its exports; other industries comprise tobacco, fibre, pineapple, tea, coconut, and alcohol.

Of the colony generally it may be stated that it imports nearly everything required for its own use, and exports almost its whole produce.

In 1937, the chief imports were articles of food and drink, iron and steel goods, cotton and woollen goods, wearing apparel, patent fuel, fertilizers, hardware, paint, soap, motor vehicles, gunny bags, salt-petre, cotton piece goods, perfumery and drugs, petroleum products, toys, tramway materials, silk, earthenware, and glassware. The principal exports, in the same year, were sugar, aloe fibre, copra, poonac, rum, and coconut oil.

**Health.**—Taken generally, Mauritius enjoys a fairly healthy climate. The principal diseases are hookworm disease and malaria.

The coastal area owes its unhealthiness during the hot season to

*Chart 2899.*

the prevalence of malaria. But this affects only the resident population; the disease can generally be avoided if it is possible to leave the area before sunset. Port Louis is malarious in the hot season, and it is inadvisable to remain in the town after sunset. The risk of malaria being contracted on vessels in the anchorage is small.

Other important causes of death are pneumonia, phthisis, and nephritis.

Venereal disease is common in Port Louis.

The death rate, in 1933, was 27·3 per 1,000.

**Dependencies.**—To Mauritius are attached as dependencies Rodriguez island; Agalega islands; Tromelin island; the Cargados Carajos group; and the Chagos archipelago.

**Currency.**—The currency of the colony and dependencies consists of Mauritius bronze coins of one cent, 2 cents, and 5 cents, and silver coins of a quarter, a half, and one rupee. Mauritius Government notes of one rupee, Rs. 5, Rs. 10, and Rs. 1,000, are in circulation. This currency is purely local, and is linked with sterling.

**Weights and measures.**—The metric system is in use.

**Standard time.**—Standard time of the meridian of 60° 00' E., or 4 hours fast on Greenwich mean time, has been adopted at Mauritius and its dependencies, with the exception of the Chagos archipelago, where that of the meridian of 75° 00' E., or 5 hours fast on Greenwich mean time, is kept.

**Communication.**—There are 110 miles of standard gauge railway, and 14 miles of light railway.

The roads are, on the whole, fairly good.

There are telegraph and telephone services throughout the island.

For details of steamer communication and telegraph cables, *see* page 25, and for a list of the coastal radio stations in the area covered by this volume, *see* page 26.

**Shipping.**—In 1941, 137 vessels, with an aggregate tonnage of 379,224, entered the ports of the island.

*Atlas of Indian Ocean currents.*

**CURRENTS.—General remarks.**—The general circulation of the Indian ocean southward of the equator is as follows. The west-going Equatorial current, passing Cap d'Ambre, the northern extremity of Madagascar, meets the African coast in the region of Cape Delgado. Some of the water turns northward, the rest flows down the coast in southerly and south-westerly directions, forming a strong coastal current. This current is known as the Mozambique current, from its inception to as far southward as Baía de Lourenço Marques (Delagoa bay). Thence onward it is known as the Agulhas current, which is reinforced by water from the Equatorial current flowing past Cap Sainte-Marie, the southern extremity of Madagascar. The southern side of the general circulation is formed by the Southern Ocean current, setting across the ocean in north-easterly and easterly directions.

Some of the water of the Agulhas current recurves south-eastward between about longs. 20° E. and 32° E., and so passes into the northern part of the Southern Ocean current; the bulk of the Agulhas current continues to follow the coastline and, passing over the Agulhas bank, enters the South Atlantic ocean, where it contributes to the flow of the Benguela current of that ocean. The eastern side of the South Indian ocean circulation is formed by the South-east trade drift, a weak flow in a north-westerly direction, adjacent to the western coast of Australia.

*Atlas of Indian Ocean currents.*

Some of the water of the northern part of the Southern Ocean current turns north-eastward and northward into the South-east trade drift, which in turn passes into the Equatorial current to complete the circulation on the eastern side of the ocean.

There is only one Equatorial current in the Indian ocean, corre-

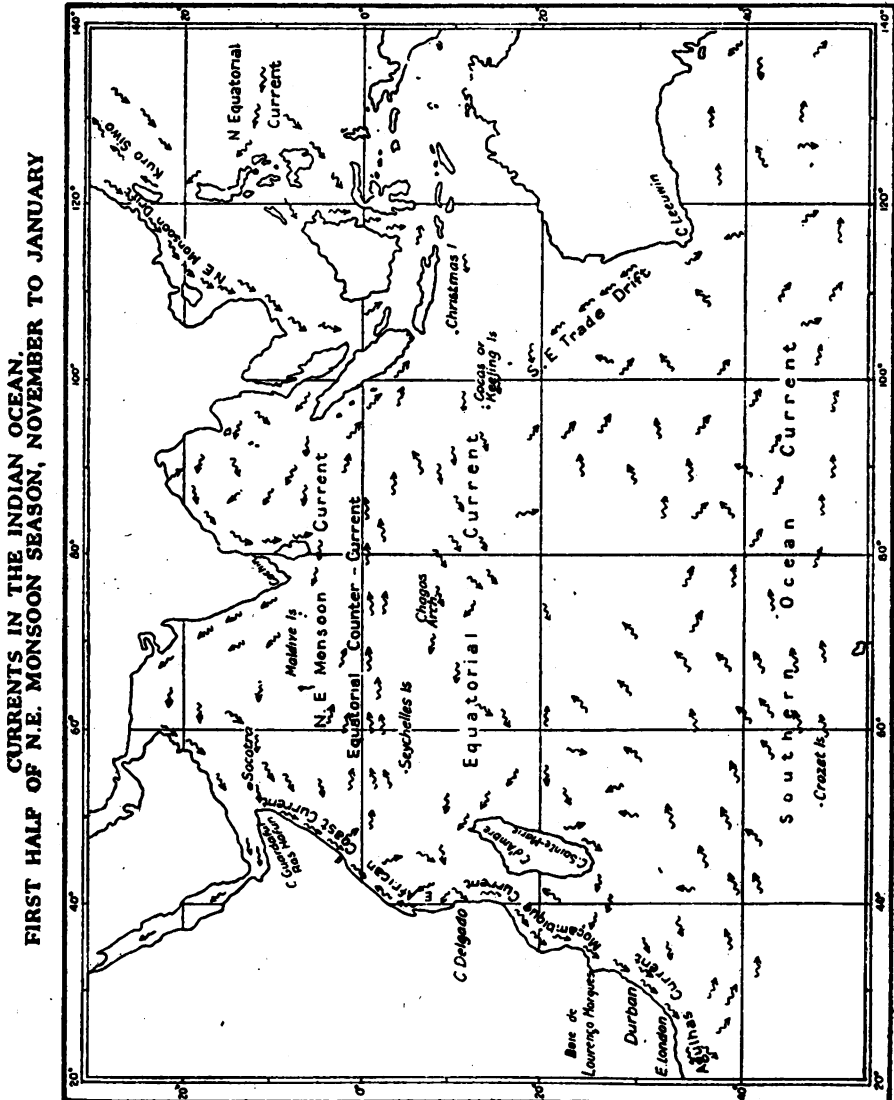


Figure 1.

responding to the South Equatorial current of the Atlantic and Pacific oceans. The west-going flow of the Equatorial current of the Indian ocean is well southward of the equator, thus differing from the South Equatorial current of the Atlantic and Pacific oceans, which extends in width to a few degrees northward of the equator.

In the Atlantic and Pacific oceans, the Equatorial counter-current

*Atlas of Indian Ocean currents.*

flows eastward, northward of the equator, between the west-going North and South Equatorial currents. In the Indian ocean, there is a corresponding east-going counter-current northward of the Equatorial current, but its flow is almost wholly southward of the equator. In the North Indian ocean, in place of the North Equatorial current of the

CURRENTS IN THE INDIAN OCEAN.  
SECOND HALF OF N.E. MONSOON SEASON, FEBRUARY TO APRIL.

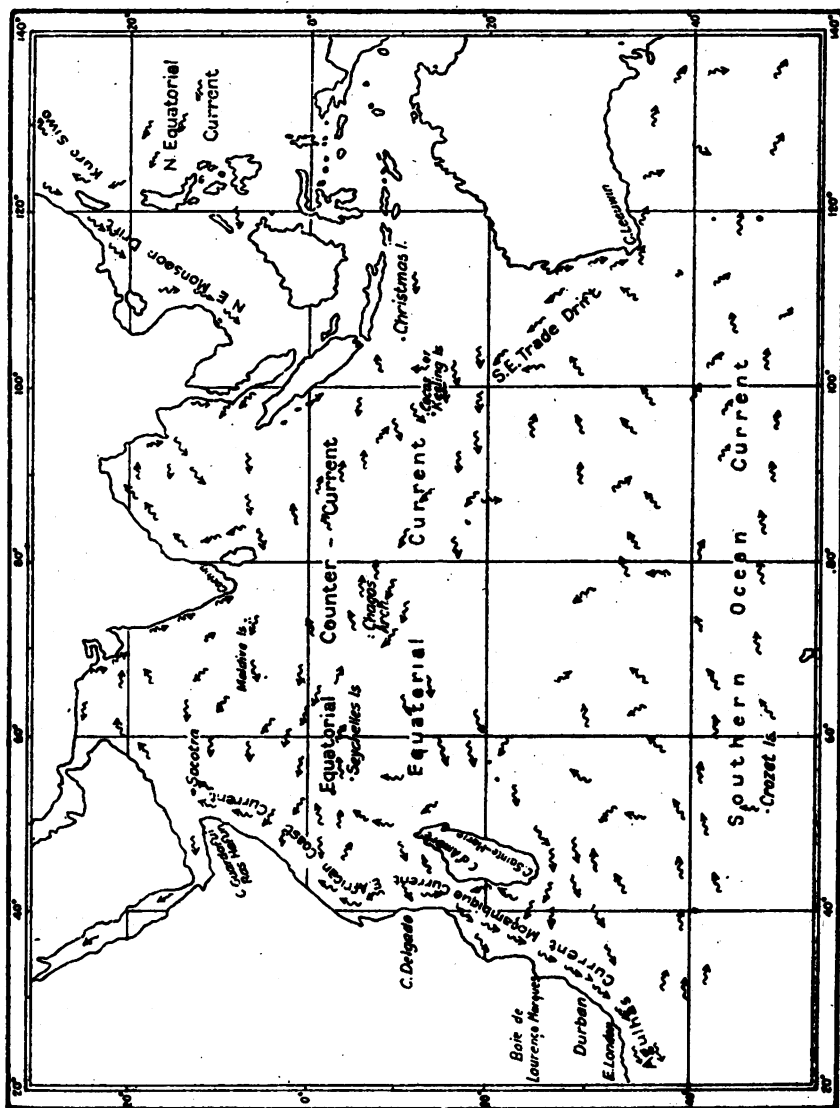


Figure 2.

other oceans, there is a drift setting seasonally, westward or eastward, according to the alternating monsoons.

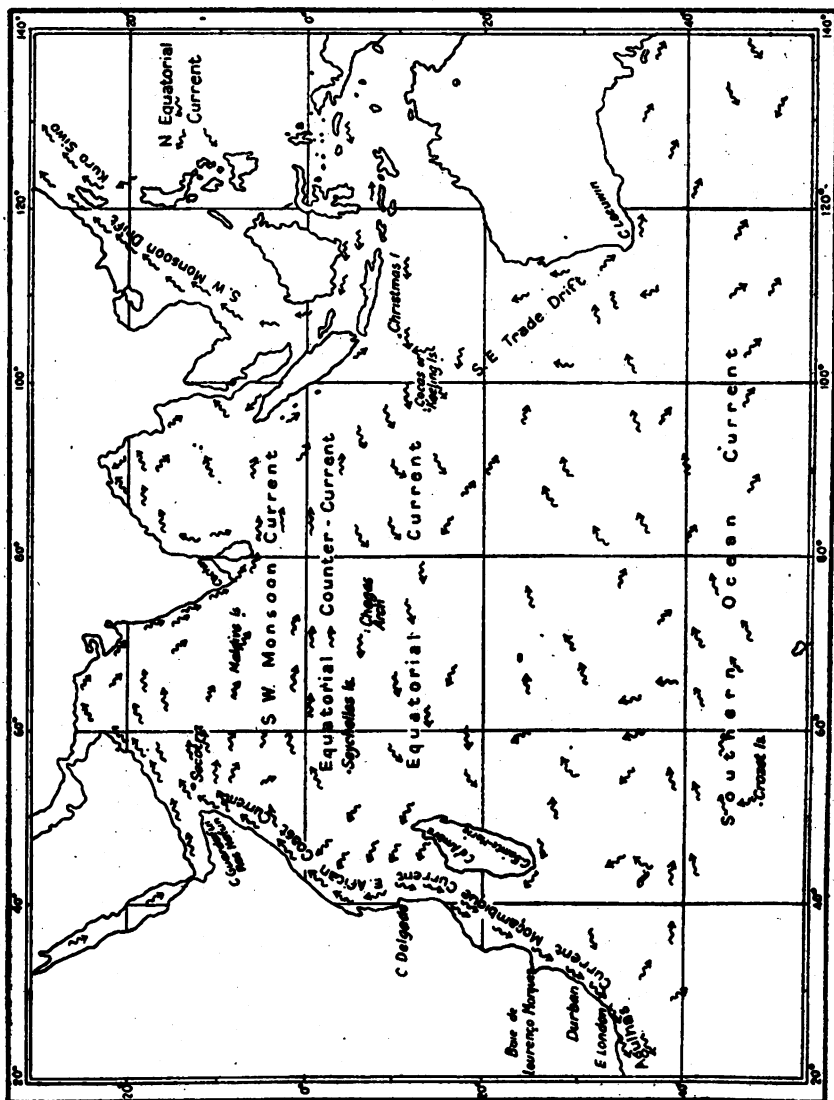
The Agulhas current and the current off the coast northward from Cabo Delgado to Capo Guardafui are more fully described in *Africa 10 Pilot*, Part III, being outside the region covered by this volume.

See Figures 1, 2, and 3 on pages 10, 11, and 12.

*Atlas of Indian Ocean currents.*

**Equatorial counter-current.**—This counter-current flows eastward across the Indian ocean throughout the year, but its mode of origin varies according to the seasonal changes of adjacent currents due to the alternation of the monsoons of the Arabian sea and Bay of Bengal. The strongest and most constant part of the counter-current

CURRENTS IN THE INDIAN OCEAN.  
S.W. MONSOON SEASON, MAY TO OCTOBER.



during the year is that in the western half of the ocean during November to January and May to July, the height of the north-east and south-west monsoons, respectively. In August to October the part  
10 flowing immediately northward of the Chagos archipelago is the strongest and most constant. Observations are scanty or lacking over

*Atlas of Indian Ocean currents.*

considerable areas of the course of this current, so that its limits in latitude can only be approximately stated.

During the height of the north-east monsoon in November to January the East African Coast current, at this time flowing southward, turns away from the coast to form the counter-current between lats.  $2^{\circ}$  N. and  $4^{\circ}$  S. Eastward of long.  $60^{\circ}$  E. the counter-current is found as far southward as lat.  $6^{\circ}$  S., and eastward of the 80th meridian it widens still further to about lat.  $8^{\circ}$  S. It meets the south-western coast of Sumatra, down which it flows. It is a fairly constant current, especially westward of the 80th meridian, although sets in other directions may be experienced. A large proportion of the currents westward of the 80th meridian attain rates of between one and 2 knots, and a moderate proportion rates of between 2 and 3 knots. Occasionally rates exceeding 3 knots are recorded in these months. The current flows northward of the Seychelles group. Eastward of the 80th meridian the proportion of stronger currents is smaller, especially towards Sumatra.

In February to April, while the north-east monsoon is weakening, the west-going monsoon drift between the equator and lat.  $4^{\circ}$  N. is much stronger than that farther northward. Part of this, meeting the coast, flows northward as the East African coast current, thus reversed in direction from the previous quarter. Another part, branching off south-westward between about longs.  $45^{\circ}$  E. and  $56^{\circ}$  E., turns counterclockwise to form the beginning of the counter-current, closely northward of the Seychelles group. Within approximately the same limits of longitude, water from the Equatorial current branches off northward and turns clockwise, westward of the Seychelles group, to contribute to the counter-current. The counter-current, beginning between lats.  $2^{\circ}$  S. and  $4^{\circ}$  S., northward of the Seychelles group, gradually widens until, eastward of the 80th meridian, it flows between lats.  $2^{\circ}$  N. and  $6^{\circ}$  S. The stronger currents occur less frequently in this quarter, but occasional ones with rates exceeding 2 knots may be met in the central longitudes of the ocean.

In May to July the counter-current is formed by water recurring from the Equatorial current, in the same region as in February to April. Water also branches off laterally from the north-going East African coast current, between the equator and lat.  $6^{\circ}$  N. and, turning eastward or south-eastward, adds to the volume of the counter-current. The southern limit of the counter-current is in about lat.  $6^{\circ}$  S. over the greater part of the Indian ocean. There is no real northern limit at this season, since the monsoonal current northward of it is flowing in the same direction across the North Indian ocean, southward of the Arabian sea and Bay of Bengal. In the longitudes of the Arabian sea the northward limit of the counter-current may perhaps be considered to be in about lat.  $2^{\circ}$  N., since northward of this the strength and constancy of the current falls off suddenly. In the longitudes of the Bay of Bengal, however, this distinction does not occur. The proportion of currents with rates of between one and 2 knots is large, and those with rates of between 2 and 3 knots are not infrequent. Very occasionally, a rate exceeding 3 knots may be met. On May 5th, 1920, a current setting eastward, at a rate of 90 miles per day, was recorded in lat.  $0^{\circ} 30'$  S., long.  $85^{\circ} 30'$  E.

In August to October, covering the transition period of the monsoon, the counter-current is relatively weak and variable westward of about long.  $68^{\circ}$  E., and westerly or other sets are often experienced in the

*Atlas of Indian Ocean currents.*

region eastward of the Seychelles group. Immediately northward of the Seychelles group, the predominant current is north-easterly. The strongest and most constant part of the east-going current at this  
 5 time is immediately northward of the Chagos archipelago. It is relatively strong and constant also in lats.  $2^{\circ}$  N. to  $2^{\circ}$  S., longs.  $80^{\circ}$  E. to  $88^{\circ}$  E.

The Seychelles group and the Chagos archipelago lie between the Equatorial current and the counter-current, so that throughout the  
 10 year the predominant set of current is eastward northward of them and westward southward of them. Each of these currents also flows actually through these groups during part of the year. From the middle of December to the middle of April, both groups are traversed by the east-going current, and from June to September by the west-  
 15 going current, *see* pages 63 and 104.

**Equatorial current.**—The Equatorial current sets westward from the Arafura sea, but is a narrow stream eastward of Christmas island. Between the longitudes of Christmas and Cocos islands it is joined by the South-east trade drift. Observations of current are scanty or  
 20 lacking over a large part of the central region of the Indian ocean, away from the shipping tracks, so that the limits, strength, and constancy of the Equatorial current in the open ocean are only imperfectly known. The northern boundary appears to be usually between lats.  $6^{\circ}$  S. and  $10^{\circ}$  S., but it is probably not a definite one, as in various  
 25 longitudes and seasons there is some recurvature of water in a clockwise direction northward from the Equatorial current to the counter-current, also in a clockwise direction southward from the counter-current to the Equatorial current. The west-going sets of the Equatorial current gradually decrease in strength and predominance with  
 30 increasing south latitude, until they are lost in the area of variable current which occupies the central longitudes of the ocean. There is probably some predominance of westerly set to about lat.  $20^{\circ}$  S. in the eastern part of the ocean and to about lat.  $25^{\circ}$  S. towards Madagascar.

35 In the open ocean, eastward of long.  $64^{\circ}$  E., a moderate proportion of currents with rates of between one and 2 knots are met. This proportion varies in different seasons and longitudes; it decreases with increasing south latitude. During the period 1910 to 1934, no current with a rate exceeding 2 knots was recorded in this part of the Equatorial  
 40 current. There is some seasonal variation of strength and constancy, but this appears to be different in different longitudes. In lats.  $8^{\circ}$  S. to  $16^{\circ}$  S., on the Colombo to Fremantle track, the strength and constancy is at a maximum in August to December, and at a minimum in February and March. In April and May it increases again to some  
 45 extent and falls a little in July.

A large part of the Equatorial current flows directly past Cap d'Ambre to the African coast. The more southerly part of the current sets towards the eastern coast of Madagascar; this flow will be described later. Westward of long.  $65^{\circ}$  E. or  $70^{\circ}$  E., the current  
 50 strengthens considerably during May to October, the period of the south-west monsoon. Between lat.  $8^{\circ}$  S. and the latitude of Cap d'Ambre, long.  $44^{\circ}$  E. to  $52^{\circ}$  E., more than half the currents experienced during this season have rates exceeding one knot, and rates exceeding 2 knots are not uncommon. Occasional currents with rates  
 55 exceeding 3 knots also occur. The predominating directions are north-west to south-south-west, inclusive. The Equatorial current,

*Atlas of Indian Ocean currents.*

westward of about long.  $60^{\circ}$  E., widens, so that its northern limit is in about lat.  $4^{\circ}$  S. It thus passes over the Seychelles bank from June to September, inclusive. Westward of long.  $52^{\circ}$  E., and therefore immediately westward of the region where water recurves north-eastward from the Equatorial current into the counter-current, westerly and north-westerly sets are found as far northward as lat.  $2^{\circ}$  S., or even to the equator, as the Equatorial current flows into the East African Coast current. 5

During the north-east monsoon period, November to January, the current past Cap d'Ambre strengthens slightly, as compared with that in the open ocean, and occasional sets exceeding 2 knots are experienced. The northward limit of the current northward of Cap d'Ambre is in about lat.  $6^{\circ}$  S. In February to April there is no such strengthening, and the width of the current northward of Cap d'Ambre is further reduced, the northward limit being in about lat.  $8^{\circ}$  S. Northward of this, the north-easterly sets of the recurvature into the counter-current are found. 10 15

Mauritius and Ile de la Réunion lie in the general flow of the Equatorial current, southward of about lat.  $12^{\circ}$  S., towards the eastern coast of Madagascar. Over most of the region between long.  $60^{\circ}$  E. and the eastern coast of Madagascar, observations of current are scanty, particularly near the greater part of this coast. All that can be said is that the currents met are variable, as elsewhere in the more southerly latitudes of the Equatorial current, with a predominance of sets between north-west and south-west. The degree of variability is probably greater southward of lat.  $22^{\circ}$  S. The water thus meeting the eastern coast of Madagascar divides, one part setting northward up the coast until it rejoins and enhances the flow past Cap d'Ambre, the other part setting south-south-westward down the coast; this latter part passes the southern extremity of Madagascar, and flows immediately southward of the Mozambique channel, with sets between west and south-west, to join the Agulhas current between Lourenço Marques and Durban. The strength of both north-going and south-going currents is said to be greatest a few miles off the Madagascar coast. The main volume of the current passing Cap Sainte-Marie is from 10 to 15 miles off-shore; close in-shore the current is weak, and may set towards the coast, see page 258. 20 25 30 35

The region of division of the north-going and south-going currents off the eastern coast of Madagascar is in the neighbourhood of Tamatave, off which port, however, either direction may be experienced, see page 301. The north-going current, which finally rounds Cap d'Ambre, is strongest during the south-west monsoon season of the North Indian ocean, on account of the general increase of strength of the Equatorial current in the western part of the ocean at that season, referred to previously. A considerable proportion of the north-going currents experienced at this time exceed one knot. The flow past the southern extremity of Madagascar is the result of the south-going coastal current, also of south-westerly sets from the region of Mauritius and Ile de la Réunion. 40 45 50

Over the whole region between long.  $64^{\circ}$  E. and the eastern coast of Madagascar, a considerable proportion of the westerly currents met have rates exceeding one knot. Southward of lat.  $20^{\circ}$  S., currents with easterly components may also exceed this rate. During the period 1910 to 1934, no currents with rates exceeding 2 knots were recorded save in November to January; these were confined to the 55



*Atlas of Indian Ocean currents.*

region between Mauritius and the central part of the Madagascan coast, within the limits of lat.  $18^{\circ}$  S. to  $22^{\circ}$  S., and were infrequent.

In the region of general westerly flow from southward of Cap Sainte-Marie towards the African coast, a high degree of variability of current is to be expected, with at times almost or quite as many easterly sets as westerly ones. A considerable proportion of currents exceeds the rate of one knot, irrespective of direction; none exceeding 2 knots has been recorded. Offshoots from this flow northward into the Mozambique channel, and are referred to in the next section.

**Mozambique channel.**—*Caution.*—The island of Madagascar screens the channel from the direct westerly flow of the Equatorial current across the ocean. Currents in the channel are affected by the varying force of those flowing round either end of Madagascar, as well as by many local conditions. The Mozambique current flows south-westward on the western side of the channel, forming the only well-defined current in the channel. It extends also into Baia de Sofala, near the shore of which a north-easterly counter-current is however sometimes found. The great strength, variety, and general uncertainty of the currents in all parts of the Mozambique channel render it necessary for a vessel's position to be constantly verified by observation.

The Mozambique current is a fairly strong and constant current throughout the year, but attains its greatest strength and constancy from about October to February, the northern monsoon season, particularly between Cabo Delgado and Mozambique. No exact estimate can be formed of the width of this current. Off the more unbroken parts of the coastline, such as that northward of Mozambique and also northward of Cabo das Correntes, it is probably 60 to 100 miles wide. The current flows across the mouth of the large Baia de Sofala but also extends in width to fill a large part of this bight, probably to the 100-fathom ( $182^{\text{m}}9$ ) line.

Rates of from one to 2 knots are frequent in the region of the Mozambique current at all times of year, and rates of between 2 and 3 knots are not uncommon. Rates exceeding 3 knots may also be experienced, except in May to July, when the current is weakest. Rates of about 4 knots, from 90 to 107 miles per day, have occasionally been recorded during the period 1910 to 1934, in the months of September to December inclusive. On the other hand, the greatest rate recorded during this period, in the months of May to July, was 64 miles per day.

The predominant directions of set within the course of the Mozambique current are from south to south-west inclusive, but sets in westerly, west-south-westerly, and south-south-easterly directions are also relatively frequent. Sets in all other directions, including those between north and north-east, in direct opposition to the normal flow of the current, may be experienced at times, either in the usual region of the Mozambique current, or immediately seaward of it. These variable and reverse sets may attain or exceed the rate of one knot.

Near the coast of Baia de Sofala, beginning almost as far southward as Cabo das Correntes, and extending northward beyond Rio dos Bons Sinais (Quelimane river) there is often a counter-current setting north-eastward and extending a considerable distance off-shore, especially off Sofala and during the strength of the southern monsoon. There is little exact information about the frequency and rate of this counter-current, which is probably weak and intermittent; a rate of 35 miles a day has, however, been recorded in May. The prevailing wind appears to have a marked effect on the set of current within a few

*Atlas of Indian Ocean currents.*

miles of the coast. Currents setting more or less directly on shore have been recorded in the neighbourhood of Beira and elsewhere in the bight; these may attain or exceed the rate of one knot at times.

Observations of current off the western coast of Madagascar are scanty. Part of the Equatorial current flowing past Cap Sainte-Marie turns northward along the south-western coast of Madagascar, but gradually weakens, and there is no evidence of a general northward current up the western coast of the island. The current is usually of no great strength; its direction appears to follow that of the wind, being sometimes northerly and sometimes southerly. Southerly currents up to a rate of  $1\frac{1}{2}$  knots have been experienced. Remarks on the currents are given, for a few localities along this coast, in Chapters VI to VIII inclusive. Off the western coast of the peninsula, of which Cap d'Ambre is the northern extremity, the combined current and tidal streams normally sets northward, at rates up to  $2\frac{1}{2}$  knots, see page 146. This passes into the main part of the Equatorial current setting westward past Cap d'Ambre.

The Equatorial current sets westward at an average rate of about  $1\frac{1}{2}$  knots between St. Lazarus bank (Africa Pilot, Part III) and Iles Comores; a little north-westward of this group, in December, it has been found setting nearly due west at a rate of from 2 to 3 knots. Iles Comores lie on the southern boundary of the Equatorial current, which flows past Ile Grande Comore (Comoro). The boundary being in about lat.  $12^{\circ}$  S., this westerly current is found northward of Ile Anjouan. In the vicinity of Ile Mayotte (Mayotta) the current is very variable. Between Ile Mayotte and Ile Anjouan, the current generally sets south-westward, but at times south-eastward with considerable strength. About the southern end of Ile Mayotte an east-going current is common. Currents in some easterly directions appear to predominate throughout most of the year southward of Iles Comores to about lat.  $14^{\circ}$  S., particularly south-eastward of Ile Mayotte, between long.  $45^{\circ}$  E. and the north-western coast of Madagascar. This easterly current turns north-eastward as it approaches this coast, and finally passes into, or forms a seaward extension of the northerly current off the western coast of the Cap d'Ambre peninsula, referred to above.

Southward, from about lat.  $14^{\circ}$  S. until past the narrow part of the Mozambique channel, no dependence can be placed on the direction or rate of the current; it may run 3 knots one way and at times as much another.

In the remaining part of the Mozambique channel, southward of lat.  $18^{\circ}$  S. and eastward of the Mozambique current, the currents experienced are variable and may set in any direction, the majority at rates up to one knot, but occasionally attaining or exceeding 2 knots. Currents with a northerly component predominate, however, in certain parts of the channel. A northerly set is thus often experienced immediately eastward of the Mozambique current. In the southern part of the channel, the sea temperature may indicate the presence of this counter-current; if below  $68^{\circ}$  it may be concluded that the vessel is certainly eastward of the south-going Mozambique current.

In the middle of the channel, between lats.  $20^{\circ}$  and  $22^{\circ}$  S., longs.  $38^{\circ}$  to  $42^{\circ}$  E., the predominant current is from north to north-east throughout the year, the wind being generally southerly. Between May and August, the strength of the southern monsoon, a current apparently sets north-westward from the southern extremity of Madagascar past Ile Europa, as far westward as long.  $40^{\circ}$  E., and then

*Atlas of Indian Ocean currents.*

turns northward, but it should not be depended on. Near this island, in November, the current has been found setting north-westward at a rate of from 2 to  $2\frac{1}{2}$  knots, causing strong tide-rips, but neither the rate nor direction of these currents may be the same for two consecutive days.

**Southern Ocean current.**—The current which flows southward of the Cape of Good Hope, from the South Atlantic ocean across the South Indian ocean, forms part of the Southern Ocean current, which sets generally eastward round the globe. It is produced by the predominating westerly winds of the Roaring Forties, and its southern limit lies on the average in about lat.  $66^{\circ}$  S. in the longitudes of the South Indian ocean.

The Southern Ocean current, in the longitudes of the South Indian ocean, is not a well-defined or constant current. It is a region of variable current with some predominance of sets having an easterly component. The variability is greater eastward of long.  $80^{\circ}$  E., than in the western half of the ocean. The most constant easterly flow is found between lats.  $38^{\circ}$  S. and  $42^{\circ}$  S., longs.  $20^{\circ}$  E. to  $60^{\circ}$  E., in August to April, and between lats.  $40^{\circ}$  S. and  $42^{\circ}$  S. and the same longitudes in May to July. In this region a moderate proportion of currents, with rates of between one and 2 knots will be met; rates exceeding 2 knots are, however, rare. Elsewhere the proportion of currents exceeding one knot is smaller, and rates exceeding 2 knots have not been recorded.

The mean resultant set, the direction of the drift of water in the long run, is eastward, between longs.  $20^{\circ}$  E. and  $40^{\circ}$  E., north-easterly between longs.  $40^{\circ}$  E. and  $80^{\circ}$  E., and between east and south-east eastward of long.  $80^{\circ}$  E. The predominant flow of current will, therefore, tend towards these directions.

The current has no defined northern boundary; the predominance of easterly sets decreases with decreasing latitude in the central longitudes of the ocean until it merges into the region of variable current southward of the Equatorial current. Some predominance of easterly sets is found as far north as lat.  $28^{\circ}$  S. or  $30^{\circ}$  S. in the central longitudes of the ocean.

One local peculiarity of direction in the Southern Ocean current remains to be mentioned. It has been stated that the most constant part of this current lies between the parallels of  $38^{\circ}$  S. and  $42^{\circ}$  S. (or  $40^{\circ}$  S. and  $42^{\circ}$  S. in May to July), westward of the 60th meridian. Immediately eastward, in the same belt of latitude, between the 60th and the 80th meridians, the current turns sharply northward during May to October, with predominating sets between north-north-east and north-north-west. Over much of this belt, northerly sets also predominate during the rest of the year. This accounts for the northerly or north-westerly sets met in the neighbourhood of Ile Saint-Paul and Ile Amsterdam, chiefly between February and October. Furthermore, the current turns sharply northward, with sets between north-north-east and north-north-west, northward of the region of more constant current, between the parallels of  $34^{\circ}$  S. and  $38^{\circ}$  S. This northerly flow covers the region between about longs.  $40^{\circ}$  E. and  $64^{\circ}$  E. or  $68^{\circ}$  E. in May to October; it may also be met locally during the rest of the year, not extending over the whole of the region referred to.

**The South-east trade drift.**—This is a region of variable current, with some predominance of sets between north and west. The resultant north-westerly flow begins off the western coast of Australia in about the latitude of Fremantle, and continues until it passes into the

*Atlas of Indian Ocean currents.*

Equatorial current in about lats.  $16^{\circ}$  S. to  $20^{\circ}$  S., long.  $95^{\circ}$  E. to  $105^{\circ}$  E. The predominance of north-westerly sets is greatest in November to January and least in May to July, when it is very slight. A small proportion of the currents met exceed the rate of one knot, including occasionally some of those not setting between north and west. 5

Of the northern part of the Southern Ocean current, flowing towards the southern part of the western coast of Australia, a portion turns northward into the South-east trade drift. The remainder turns south-eastward to rejoin the general easterly flow southward of West Cape Howe. 10

**Effect of a tropical revolving storm on the current.**—In the vicinity of a tropical revolving storm, the set and drift of current may be markedly different from that normally to be expected. Comparatively little is known about such currents, particularly near the centre of the storm, since navigators avoid the centre whenever possible, and conditions within the storm field generally are unfavourable to the accurate observation of current. 15

The primary cause of the currents is the strong wind associated with the storm. The strength of current produced by a given force of wind varies with latitude, and is greatest in low latitudes. For the latitudes of tropical storms, say  $15^{\circ}$  to  $25^{\circ}$ , a wind force of 10 would produce a current of about one knot. It is believed that the strength of the currents of tropical storms is, on the average, the same as that which wind of similar force, unconnected with a tropical revolving storm, would produce. These currents, at the surface of the water, set at  $45^{\circ}$  to the right of the wind direction (in the northern hemisphere), and, therefore, flow obliquely outward from the storm field, though not radially from the centre. 20 25

Unless due allowance is made for these sets, very serious errors in reckoning may, therefore, arise. It is reported that, in one case, a vessel experienced a south-easterly set of more than 50 miles, under conditions when the set normally to be expected was south-westerly. In another case, an unexpected south-south-westerly set of 60 miles was experienced in 18 hours. These are examples of currents of abnormal strength, which are occasionally met in the vicinity of tropical revolving storms, and which cannot be accounted for by the wind strength. The possibility of such an experience should be borne in mind, particularly near, say within 100 miles of the centre of, the storm. 30 35 40

Other currents, not caused directly by the wind, may flow in connection with these storms, but are probably weak and, therefore, negligible in comparison with the wind current.

The above remarks apply to the open ocean. When a tropical storm approaches, or crosses, an extended coastline, such as that of Florida, a strong gradient current parallel to the coast will be produced by the piling up of water against the coast. The sea-level may rise by as much as from 8 to 15 feet ( $2\text{m}4$  to  $4\text{m}6$ ) on such an occasion. 45

Whether the storm is in the open ocean or not, there is a rise of sea-level inwards to its centre which compensates for the reduction of atmospheric pressure. The extent of this rise is never great, from one to 2 feet ( $0\text{m}3$  to  $0\text{m}6$ ) according to the intensity of the storm; it produces no current so long as the storm is not changing in intensity. If the storm meets the coast, however, the accumulation of water at its centre will enhance the rise of sea level at the coast mentioned above, and so produce a stronger gradient current along the coast. 50 55

*Chart 1241.*

**ICE.**—The latitude of the mean northerly limit of pack-ice, in the longitudes of the South Indian ocean, varies according to longitude and season, as also does the extreme northerly limit of pack-ice in bad ice 5 years. Neither of these limits reaches as far northward as the 50th parallel at any time of the year, and in February and March both lie almost wholly southward of the 60th parallel. Pack-ice will, therefore, not be met in the region covered by this volume.

Icebergs melt less rapidly, and continue to drift, in general, north- 10 eastward, being acted on both by the Southern Ocean current and the prevailing westerly winds. In the longitudes of the South Indian ocean, at all times of the year, the mean limit of bergs lies everywhere northward of the extreme limit of pack-ice, while the extreme limit of bergs lies still farther northward. In no month, however, does the 15 mean limit of bergs extend farther northward than about lat. 44° S. It lies between lats. 44° S. and 46° S. in November to March inclusive; over most of the region between longs. 20° E. and 60° E. In other longitudes, and in other months, it is farther southward; in May and June it lies wholly southward of the 50th parallel in all longitudes of 20 the South Indian ocean.

Northward of the 44th parallel, bergs are most likely to be encountered in the months of August and September. The extreme limit of bergs lies farthest northward during these months, when it is nearly coincident with the 40th parallel over the whole extent of the South 25 Indian ocean. Between longs. 70° E. and 90° E. it reaches lat. 38° S.

During the rest of the year the extreme limit of bergs extends to lat. 39° S. or 40° S. between longs. 20° E. and 40° E. Eastward of long. 40° E., it gradually trends farther southward, until it meets the 50th parallel in longitudes southward of Australia.

30 Small pieces of ice, the remnants of bergs, may be encountered well northward of the extreme limit of bergs, but their occurrence has been very rare in the past 60 years.

The glacier bergs, which are derived from the ice tongues of glaciers, are irregular in shape and much smaller than the tabular bergs, which 35 are derived from the shelf ice or barrier formations. Glacier bergs are usually of a greenish tint, but may appear dazzling white under certain conditions of light.

Tabular bergs, usually from 60 to 140 feet (18<sup>m</sup>3 to 42<sup>m</sup>7) in elevation, are flat topped and rectangular in shape; they have frequently 40 been measured up to twenty and thirty miles in length, while one such berg has been observed one hundred miles in length. Owing to their white colour they appear at a distance as if formed of plaster of Paris.

Vessels can depend upon no forewarning of ice beyond the limit of visibility; the greatest safeguards are keeping a sharp look-out, 45 and navigating at such a speed as will enable the ship to stop, or alter course, before colliding with a berg just visible ahead.

No reliance whatever can be attached to echoes from the steam whistle or syren giving a warning of ice, nor does the presence of a berg have any appreciable effect on the temperature of the air or sea. 50 During light fog, or drizzling rain, bergs are not visible from a distance of more than from 2 to 3 miles. In light low fogs bergs can generally be picked up by the look-out aloft before they can be observed from the bridge.

In dense fog a berg cannot be seen from a distance of more than 55 a cable, when, if the sun is shining, it appears as a luminous white mass. With no sun it first appears close aboard as a dark mass.

*Chart 1241.*

The bow look-out will probably first detect the ice, as the first visible sign is the wash and breaking of the sea on the base of the berg.

On a clear dark night a berg will not be seen by the naked eye from a distance of more than a quarter of a mile.

The distance from which a berg can be seen on a clear moonlight night depends upon (a) the altitude and age of the moon and (b) the relative position of berg, moon, and vessel.

A berg placed between a vessel and the moon when low is the most difficult to observe, while pieces of bergs and growlers are practically invisible until close alongside. With the moon astern bergs show clear and bright as in daylight.

With a full moon at not less than  $35^{\circ}$  in altitude, covered by a thin film of cirro-stratus cloud, a berg is visible to the naked eye from a distance of 5 miles, irrespective of the relative position of moon, berg, and vessel.

**MISCELLANEOUS INFORMATION.—Abnormal magnetic variation.**—Abnormal magnetic variation has been experienced, when in shallow water, off the coasts of Madagascar.

**Consular stations.**—British Consular officers are stationed at Majunga and Tamatave.

**Deratisation.**—In accordance with Article 28 of the Sanitary Convention of 21st June, 1926, deratisation can be carried out, and Deratisation and Deratisation Exemption certificates can be issued to vessels, at the following ports:—Majunga, Diégo-Suarez, and Tamatave, in Madagascar, and at Port Louis, in Mauritius.

At Port Victoria, Seychelles, vessels of not more than 500 tons can be deratised.

**Firing danger areas.**—Firing and bombing practices take place in a great number of areas off the coasts of Great Britain, Northern Ireland and Eire, and the number of areas in the waters of Commonwealth, Dominion, Colonial and Foreign Governments is increasing.

In future, and in view of the responsibility of range authorities to avoid accidents, limits of practice areas will not be shown on charts and descriptions of areas will not appear in the Sailing Directions. Such range beacons, lights, marking buoys or targets as may be of assistance to the Mariner will, however, be shown on charts and when appropriate, mentioned in the appropriate volume of Sailing Directions.

Lights will be mentioned in the Admiralty List of Lights.

The principal types of practices carried out are:—

(a) *Bombing practice from aircraft.*

Warning signals usually shown.

(b) *Air to air, and air to sea or ground firing.*

The former is carried out by aircraft at a large white or red sleeve or flag towed by another aircraft moving on a steady course. The latter is carried out from aircraft at towed or stationary targets on sea or land, the firing taking place to seaward in the case of those on land.

As a general rule, warning signals are shown when the targets are stationary, but not when towed targets are used.

(c) *Anti-aircraft firing.*

This may be from A.A. guns or machine guns at a target towed by aircraft as in (b) above, or at balloons or kites. Practice may take place from shore batteries or ships.

Warning signals as a rule are shown from shore batteries but not from ships.

(d) *Firing from shore batteries or ships at sea at fixed or floating targets.*

Warning signals usually shown as in (c).

5 Warning signals, when given, usually consist of red flags by day and *red fixed* or *red flashing* lights at night. The absence of any such signal cannot, however, be accepted as evidence that a practice area does not exist. Warning signals are shown from shortly before practice commences until it ceases.

10 Aircraft are also sometimes used to warn shipping of their proximity to a danger area where practice is in progress. The method adopted, known as "buzzing," consists of low flying by the aircraft with repeated opening and closing of the engine throttle.

*Caution.*—A vessel may be aware of the existence of a practice area  
15 from Local Notices to Mariners or similar method of promulgation and by observing the warning signals or the practice.

She should, whenever possible, avoid passing through an area in which a practice is in progress, but if compelled to do so should endeavour to clear it at the earliest possible moment.

20 If during anti-aircraft, air to air, sea or ground firing practice, projectiles or splinters are observed to be falling near a vessel, she should maintain her course and speed and all persons on board should take cover. Every practicable precaution, however, will be taken by the Authority in charge of the practice to avoid the risk of damage from  
25 falling shell splinters, bullets, etc., to vessels and all on board them within the area.

**Fuel.**—Coal can be obtained at Port Victoria in the Seychelles group, at Baie de Diégo-Suarez in Madagascar, and at Port Louis in Mauritius.

30 Diesel oil is stocked at Port Victoria, and fuel oil is obtainable at Majunga and Diégo-Suarez.

**Hydrographic information.**—Hydrographic information with regard to the coasts and ports of Madagascar, and also information with regard to the weather conditions, can be obtained at Diégo-Suarez and  
35 at Tamatave.

**Pilotage.**—Pilotage is not compulsory in any port in Madagascar. If a vessel requires a pilot the Harbour Master acts in that capacity.

**Port limits.**—In Madagascar and its dependencies, at places where  
40 port limits are in force, merchant vessels may not load or unload outside these limits without special permission from the Customs authorities.

The ports at which these limits are in force are :—Analalava, Antalaha, Dzaoudzi, Farafangana, Fenérive, Fomboni, Fort Dauphin,  
45 Hellville, Mahanoro, Maintirano, Majunga, Manakara, Maroantsetra, Morombé, Morondava, Moroni, Mutsamudu, Sainte-Marie, Tamatave, Tuléar, Vatomandry, and Vohémar.

**Repairs.**—There are no Naval dockyards or establishments on any of the British possessions within the limits of this work. The French  
50 Government have a Naval establishment at Diégo-Suarez in Madagascar, where there is a basin and dry dock.

Large repairs can be carried out at Diégo-Suarez ; minor repairs at Port Louis in Mauritius ; and small repairs at Port Victoria in the Seychelles group, at Tamatave in Madagascar, and at Port des Galets  
55 in Ile de la Réunion.

**Submarine cables.**—The following articles are taken from the

International Convention for the Protection of Submarine Telegraph Cables, of 14th March, 1884 :—

II. It is a punishable offence to break or injure a submarine cable, wilfully or by culpable negligence, in such manner as might interrupt or obstruct telegraphic communication, either wholly or partially, 5 such punishment being without prejudice to any civil action for damages.

This provision does not apply to cases where those who break or injure a cable do so with the lawful object of saving their lives or their ship, after they have taken every necessary precaution to avoid 10 so breaking or injuring the cable.

V. Vessels engaged in laying or repairing submarine cables shall conform to the regulations as to signals which have been, or may be, adopted by mutual agreement among the High Contracting Parties, 15 with the view of preventing collisions at sea.

When the ship engaged in repairing a cable exhibits the said signals, other vessels which see them, or are able to see them, shall withdraw to or keep beyond a distance of one nautical mile at least from the ship in question, so as not to interfere with her operations.

Fishing gear and nets shall be kept at the same distance. 20

Nevertheless, fishing vessels which see or are able to see a telegraph-ship exhibiting the said signals, shall be allowed a period of twenty-four hours at most within which to obey the notice so given, during 25 which time they shall not be interfered with in any way.

The operations of the telegraph-ships shall be completed as quickly 25 as possible.

VI. Vessels which see, or are able to see, the buoys showing the position of a cable when the latter is being laid, is out of order, or is broken, shall keep beyond a distance of one-quarter of a nautical 30 mile at least from the said buoys.

Fishing nets and gear shall be kept at the same distance.

VII. Owners of ships or vessels who can prove that they have sacrificed an anchor, a net, or other fishing gear in order to avoid 35 injuring a submarine cable, shall receive compensation from the owner of the cable.

In order to establish a claim to such compensation, a statement, supported by the evidence of the crew, should, whenever possible, be drawn up immediately after the occurrence ; and the master must, 40 within twenty-four hours after his return to or next putting into port, make a declaration to the proper authorities.

The latter shall communicate the information to the Consular authorities of the country to which the owner of the cable belongs.

### REGULATIONS.—Approaching French territorial waters in time of war.—

1. In time of war, the visits of vessels, other than French vessels 45 of war, to anchorages and ports of France, her colonies, protectorates, and mandated territories, are governed by the following regulations ; dated 1st October, 1934.

2. No French merchant vessel, nor foreign vessel of war or merchant vessel, may approach within 3 miles of the coast without per- 50 mission except at the risk of being destroyed.

3. Every vessel affected by the present decree must display her national flag on approaching the prohibited zones, and also her International code number ; at night, she must exhibit her navigation 55 lights.



If desirous of entering the prohibited zone in order to reach a port, permission must be asked as follows :—

By day, by hoisting the pilot flag (G flag of the International Code of Signals).

- 5 By night, by making the visual signal P. T. (a pilot is required), followed by her International code number, or, if she has no means of doing this, by making the night signal for a pilot in accordance with the International Code of Signals, viz., a *white* light flashed or shown just above the bulwarks at short or frequent intervals for *about a*  
10 *minute* at a time, accompanied if necessary by a *blue* light *every fifteen minutes*.

The vessel must remain outside the zone until she has received a reply from a signal station or from an examination vessel.

- The reply from the signal station or from the examination vessel  
15 is made as follows :—

Entry permitted :

By day, by searchlight, " UI " in morse code, repeated three times, or flags " UI " of the International Code of Signals.

- By night, by searchlight or flashing light, " UI " in morse code,  
20 repeated three times, or by a *white* Very's light.

Entry forbidden :

By day, by searchlight, " UJ " in morse code, repeated three times, or flags " UJ " of the International Code of Signals.

- By night, by searchlight or flashing light, " UJ " in morse code,  
25 repeated three times, or by a *red-green* Very's light.

- If permission is granted, the vessel must enter the prohibited zone at reduced speed, displaying by day flag " G " of the International Code of Signals, and at night exhibiting her navigation lights, and must steer for the examination vessel. The latter has normally no distinguishing marks, but, if she wishes to show vessels in sight that she is engaged on examination duties, she shows at the masthead a black ball by day and a *red* light by night ; or alternatively " MAJ " in morse code by flashing light repeated three times.

- If entry be refused, the visiting vessel must immediately alter  
35 course and proceed to some other anchorage.

Article 4 relates to certain prohibited zones, none of which is in the area included in this volume.

5. In fog or thick weather, every vessel desirous of entering the forbidden zone is to hoist the same signals as in clear weather, and  
40 blow blasts on the siren or whistle until permission to enter has been given by an examination vessel.

6. Every vessel approaching the forbidden zone must immediately comply with the orders of a vessel of war or an examination vessel, or signal station, given by voice, the International Code of Signals, or  
45 warning gun.

- Any vessel warned by a battery or vessel of war must immediately alter course by more than 90°, and steer so that she remains in sight of signals from the vessel of war or signal station nearest to the battery that warned her. She may not proceed on her former course until  
50 authorised to do so.

If the vessel does not alter course after a blank charge has been fired to warn her, a live shell will be fired a few minutes later, and if a vessel does not immediately conform to this order, effective fire will be opened on her.

- 55 In case of emergency the firing with blank may be omitted.

At night the warning gun may be omitted, and every vessel entering

the forbidden zone without permission is liable to be destroyed without preliminary warning.

7. Vessels authorised to enter roads and ports in France, or in the French colonies, protectorates, or mandated territories, must keep strictly within the approach channel.

For this purpose they will be piloted by a vessel set apart for this duty. Should a port have no pilotage vessel, the examination vessel will send a pilot on board the visiting vessel.

Vessels must take up the berths assigned to them, and conform strictly to the special regulations in force.

The length of stay of a vessel will depend on military considerations, and, when circumstances require it, a vessel may be ordered to go to sea, or to move to a given point; such order must be carried out without delay, though respite may be allowed to vessels really unable to conform to it immediately.

No vessel is to get under way, either to shift berth or to quit the anchorage, without the permission of the local authority; a request may be made by displaying flag "G" of the International Code of Signals.

8. In naval roads and ports, between sunset and sunrise, the movement of boats other than those of French vessels of war is absolutely forbidden.

From sunrise to sunset movement is only allowed to boats which have received a special permit from the naval authorities, with the means of distinguishing them. Boats with permits should keep clear of vessels of war if ordered to do so, and cannot in any case go alongside the latter without their permission. The movements of these boats will, moreover, remain subject to local regulations, notably those relative to the prohibition to enter certain parts of the roadstead, and to go alongside any place other than those expressly notified.

In commercial ports similar measures will be taken by the local authority to impose the restrictions considered necessary on the movements of boats, due regard being given to the interests of commerce.

9. Visits by neutral vessels of war are governed by the regulations for the admission of foreign vessels of war in time of peace so far as notification or previous authorisation is concerned.

10. The above regulations come into force on mobilisation or on special notice.

11. Any infraction of the above regulations will lead to such repressive measures as the circumstances admit, in addition to the risk of destruction incurred.

**COMMUNICATIONS.—Sea.**—The Seychelles group has regular steamer communication with India, Africa, and Europe. There is a regular service to Batavia. Communication between the Seychelles group and its dependencies, and Mauritius, is maintained by small vessels and sailing craft.

Madagascar has regular steamer communication with Europe, Africa, Aden, Ile de la Réunion, and Mauritius.

Mauritius has regular steamer communication with Europe, Africa, Madagascar, Ile de la Réunion, Rodriguez island, Colombo, Singapore, and Batavia.

**Telegraph.**—The Seychelles group, Madagascar, Ile de la Réunion, Mauritius, and Rodriguez island are connected, by cable, with the universal telegraph system.

**AIR LIGHTS.**—Mariners are informed that lights near the coast, which have been established for the use of aircraft and which may be visible from seaward, will be shown on Admiralty charts and described in the Admiralty List of Lights. Care should be taken that  
 5 these lights are not confused with those established for the use of shipping.

**RADIO STATIONS.**—Coastal radio stations in the area covered by this volume, which are open for public correspondence, are established at :—Port Victoria in the Seychelles group ; Ilot Dzaoudzi in  
 10 Iles Comores ; Majunga, Maintirano, Tuléar, Diégo-Suarez, and Tamatave, in Madagascar ; Saint-Denis in Ile de la Réunion ; and Mauritius.

For details, *see* List published by the Bureau of the International Telecommunication Union.

15 For details of radio stations which transmit weather bulletins, storm signals, navigational warnings, time signals, etc., *see* Admiralty List of Radio Signals.

**SIGNALS.**—**Aircraft distress signals.**—Any aircraft in grave or imminent danger, and requiring immediate assistance, will make or  
 20 display one or more of the following signals :—

1. The International distress signal S O S by radio, as prescribed in the Admiralty List of Radio Signals.
2. The spoken word "Mayday" by wireless telephony, as prescribed in the Admiralty List of Radio Signals.
- 25 3. The International distress signal S O S by visual signalling or any sound apparatus.
4. The International Code flag signal N C.
5. The International Code distance signal, consisting of a square flag having above or below it a ball or anything resembling  
 30 a ball.
6. A continuous sounding of any sound apparatus.
7. A succession of *red* pyrotechnic lights fired at short intervals, or a *red* flare from which, at intervals of about *three seconds*, a *red* light is ejected.

35 **Urgent signals from aircraft.**—An aircraft, having a very urgent message to communicate to a vessel, concerning the safety of any aircraft, vessel, or person, within range of assistance, will fly low round the vessel, firing a succession of *green* pyrotechnic lights, or will flash a succession of *green* flashes with the daylight signalling apparatus.

40 The aircraft will, then, signal the message as prescribed in the International Code of Signals ; or alight alongside the vessel ; or, if unable to signal or alight, will fly towards the aircraft, vessel, or person, in distress. When the *green* pyrotechnic lights are seen by the vessel, a boat is to be prepared for lowering.

45 The signals from the aircraft are to be acknowledged by the vessel by flashing the answering sign, whether by day or at night, with the daylight signalling apparatus ; if no such apparatus be carried, the answering pendant is to be hoisted close up, by day, and, at night, a *white* light is to be waved in a position away from other sources of  
 50 light.

If an aircraft is in difficulties which compel her to land, but is not in need of immediate assistance, she will fire a succession of *white* pyrotechnic lights or, at night, if not in possession of pyrotechnic lights, she will make a succession of short flashes with her navigation lights.

**Non-urgent signals from aircraft.**—An aircraft wishing to communicate with a vessel on a matter of no urgency, will fly around the vessel to attract attention.

**Storm signals.**—Signals indicating the localities threatened by a cyclone are shown at the following ports in Madagascar :—Moroni, 5 Fomboni, Mutsamudu, Dzaoudzi, Helville, Analalava, Maintirano, Morondava, Morombé, Tuléar, Diégo-Suarez, Vohémar, Antalaha, Moroantsetra, Port Sainte-Marie, Tamatave, Vatomandry, Mahanoro, Mananjary, Manakara, Farafangana, and Fort Dauphin.

Vessels can communicate with these stations by means of the 10 International Code of Signals.

These storm signals are indicated by means of a black cylinder and black cones displayed from a flagstaff, as follows :—

Signal.	Locality threatened.
1 Cylinder above two cones points upwards	Between Diégo-Suarez and Antalaha.
2 Cylinder between two cones points upwards	Between Antalaha and Port Sainte-Marie.
3 Cylinder below two cones points upwards	Between Port Sainte-Marie and Vatomandry.
4 Cylinder above two cones points downwards	Between Vatomandry and Mananjary.
5 Cylinder between two cones points downwards	Between Mananjary and Farafangana.
6 Cylinder below two cones points downwards	Between Farafangana and Fort Dauphin.
7 Cylinder below two cones, the upper cone point downwards, the lower point upwards	Between Diégo-Suarez and Nossi-Bé.
8 Cylinder above a cone point upwards.	Between Nossi-Bé and Majunga.
9 Cylinder below a cone point upwards	Between Majunga and Maintirano.
10 Cylinder above a cone point downwards	Between Maintirano and Morondava.
11 Cylinder below a cone point downwards	Between Morondava and Tuléar.
12 Cylinder above two cones, the upper cone point downwards, the lower point upwards	Between Tuléar and Fort Dauphin.
13 Cylinder between two cones points towards the cylinder	Iles Comores.
14 Cylinder between two cones bases towards the cylinder	The western part of Iles Comores.

These storm signals are numbered from 1 to 14, as shown, to permit of rapid transmission by radio. 15

For a description of the storm signals displayed at Mauritius see page 351, and at Ile de la Réunion, see page 334.

International storm signals, in accordance with the Lisbon convention of October, 1930, will be shown as follows :—the day signals will be displayed at Tuléar, Diégo-Suarez, Tamatave, and Manakara ; 20 the night signals will be exhibited at Diégo-Suarez and Tamatave.

Signification.	Day signal.	Night signal.
Gale from the north-western quadrant.	One cone point up.	Two red lights disposed vertically.
Gale from the south-western quadrant.	One cone point down.	Two white lights disposed vertically.

Signification.	Day signal.	Night signal.
Gale from the north-eastern quadrant.	Two cones points up disposed vertically.	A <i>red</i> light over a <i>white</i> light.
Gale from the south-eastern quadrant.	Two cones points down disposed vertically.	A <i>white</i> light over a <i>red</i> light.
Bad weather probable.	One ball.	A <i>red</i> light.
Cyclone or gale probable.	Two balls disposed vertically.	Two <i>red</i> lights disposed horizontally.
Direction of wind changing clockwise.	A black flag or black cylinder.	
Direction of wind changing anti-clockwise.	Two black flags or two black cylinders.	

The signal showing the way the wind is changing in direction is displayed alongside the signal indicating its direction.

These signals are shown for 48 hours after the receipt of the gale warning, unless cancelled.

#### 5 Signals regulating the entry and departure of vessels.—

The following signals in accordance with the Lisbon convention of October, 1930, will be shown at Diégo-Suarez and Tamatave.

Signification.	Day signal.	Night signal.
IN CASE OF GREAT EMERGENCY		
Entry absolutely forbidden.	Three balls disposed vertically.	Three <i>red</i> lights disposed vertically.
IN NORMAL CASES		
Entry forbidden.	A cone point up between two balls, disposed vertically.	A <i>white</i> light between two <i>red</i> lights, disposed vertically.
Entry and departure forbidden.	Two cones points together above a ball.	A <i>white</i> light above a <i>red</i> light and surmounted by a <i>green</i> light.
Departure forbidden.	Two cones points together above a cone point down.	A <i>white</i> light between two <i>green</i> lights disposed vertically.

- Signals to be made by vessels when inconvenienced by searchlights.**—In the event of the navigation of a vessel being inconvenienced  
 10 by the glare from searchlights near a port in the British Empire, she should make the International Code signal ZO (— . . —) by lamp and by whistle, siren, or fog horn.

Both the light and sound signals should be employed, whenever possible, and should be repeated until the inconvenience is removed.

- 15 Only real urgency should necessitate the use of this signal, as, unless the vessel be actually in the rays of a searchlight, it is not possible for the operators to know which projector is affected.

This signal is designed to assist mariners ; no liability whatever will be admitted.

- 20 This signal should also be used in similar circumstances near ports in other countries.

**French submarines.**—When meeting other vessels, submarines navigating on the surface will conform with the regulations for preventing collisions at sea.

- 25 The vessel conveying submarines which are submerged will display a square flag coloured red and yellow horizontally. Vessels in the vicinity must be navigated with great caution, and a wide berth given to the escorting vessel.

- 30 **Lloyd's signal station.**—The only Lloyd's signal station, within the limits of this volume, is established on Signal mountain, Port Louis, Mauritius. For details see Admiralty List of Lights, Part X.

**CAUTION WITH REGARD TO SINGLE SHIPS APPROACHING SQUADRONS OR AIRCRAFT CARRIERS.**—The attention of shipowners and mariners is called to the danger to all concerned which is caused by single vessels approaching a squadron of warships or merchant vessels in convoy so closely as to involve risk of collision or attempting to pass ahead of or through such a squadron or convoy. 5

Mariners are therefore warned that single vessels should adopt early measures to keep out of the way of a squadron or convoy.

The fact that it is the duty of a single vessel to keep out of the way 10 of a squadron or convoy does not entitle vessels so sailing in company to proceed without regard to the movements of the single vessel. Vessels sailing in a squadron or convoy should accordingly keep a careful watch on the movements of any single vessel approaching the squadron or convoy and should be ready, in case the single vessel does 15 not keep out of the way, to take such action as will best aid to avert collision.

Attention is also drawn to the uncertainty of the movements of aircraft carriers, which must usually turn into the wind when aircraft are taking off or landing. 20

*Charts 1077, 1078.*

**PASSAGES.—General remarks.**—Full-powered vessels make their passages by the most direct safe route, with, occasionally, some slight divergence to secure a favourable current, or to avoid a heavy sea, etc. 25

Low-powered vessels follow those routes where they are most likely to be favoured with leading winds, and by currents, distance being a secondary consideration, and often considerably increased.

Such vessels can in some cases take the full-powered steamer route, but must always be guided by the extent of their steaming capacity. 30 See Admiralty book of Ocean Passages.

**Zanzibar to Mauritius.**—Full-powered vessels should proceed direct.

Low-powered vessels, from April to October, should stand eastward, regardless of crossing the Equator in so doing, until eastward of the 35 Chagos group, when southing should be made into the trade wind, and then a direct course steered for Mauritius.

From November to April, low-powered vessels should make easting with the north-east and north-west monsoons and cross lat.  $10^{\circ}$  S. in about long.  $70^{\circ}$  E., and thence proceed direct through the trade wind 40 to Mauritius. Vessels should keep northward of a line drawn from Zanzibar to the Seychelles until in the north-west monsoon.

An alternative route at this latter season is to stand down through the Mozambique channel, taking advantage of the current on the African coast; then, from the southern end of the channel, a vessel 45 should stand south-eastward into the westerly winds, and make easting southward of the  $35^{\text{th}}$  parallel. A vessel should then recross lat.  $30^{\circ}$  S. in about long.  $58^{\circ}$  or  $59^{\circ}$  E., and then make direct for Mauritius through the trade.

This being the cyclone season, the first route is the safest, as the 50 path of these cyclones is then more easily avoided.

In leaving Zanzibar in either season, it is best to run through the lee pass, for the time being. If bound southward during the south-west monsoon, this appears to put a vessel a long way to leeward, but, as a rule, nothing is lost by it; for in order to work southward, an offing of 55

*Charts 1077, 1078.*

90 miles must be gained to be clear of the north-going inshore current, and this can be accomplished in a shorter time by proceeding with a fair wind.

5 *Return route.*—Direct for all vessels.

**Zanzibar to the Seychelles.**—Full-powered vessels should proceed direct.

Low-powered vessels, from April to October, stand eastward, and if unable to fetch the islands continue on past them until able to make 10 them from northward. About June and July vessels can generally fetch them.

From October to April, low-powered vessels should keep northward of the direct route while working eastward until the north-west monsoon is picked up, which may be expected, but is very uncertain, after 15 passing long.  $45^{\circ}$  E. Light winds and calms may be expected.

*Return route.*—Full-powered steamers should proceed direct.

Low-powered vessels, from April to October, should proceed direct, but allowance should be made for the probability of the wind heading and for the strong northerly current to be entered on nearing the 20 African coast. It is best to sight the northern end of Mafia island, and then to pass inshore of Latham island.

From October to April, low-powered vessels should proceed direct.

**Porto de Moçambique to the Seychelles.**—Full-powered vessels should proceed direct.

25 Low-powered vessels, from April to October, proceed direct.

From November to March, they should stand across to the Madagascan coast, then north-eastward along that coast until near Cap d'Ambre; thence they should proceed northward, passing eastward of the Amirante islands.

30 *Return route.*—Full-powered vessels should proceed direct.

Low-powered vessels, from April to October, should pass southward of the southern end of Mahé island; thence south-eastward of Alphonse island, and close north-westward of Providence island; thence, as direct as possible. Towards the end of the season, a vessel may even 35 pass south-eastward of the Farquhar islands.

From November to March, low-powered vessels should proceed as direct as possible.

**Mozambique to Mauritius.**—Full-powered steamers should proceed as direct as possible round the northern end of Madagascar.

40 Low-powered vessels, from April to October, should stand southward, keeping in the strength of the current on the African side of the channel, as far as Cabo das Correntes, or even farther southward; thence, they should stand south-eastward, and make easting on about the parallel of  $30^{\circ}$  S. until on the meridian of Mauritius; from thence 45 they can proceed direct in the south-east trade.

From November to March, low-powered vessels should stand down the African coast, keeping in the strength of the current. Then, from the southern end of the Mozambique channel, they should stand south-eastward into the westerly winds, and make easting southward of lat. 50  $35^{\circ}$  S. They should recross the parallel of  $30^{\circ}$  S. in long.  $58^{\circ}$  or  $59^{\circ}$  E., and make direct for Mauritius through the trade wind.

An alternative route in case a south-westerly wind should be blowing in the Mozambique channel at the time of leaving port, a thing not unknown during the season of the north-east monsoon, is, to stand over 55 to the Madagascan coast, proceeding north-eastward along it to near Cap d'Ambre, then to stand northward, and make easting southward of

*Charts 1077, 1078.*

the Amirante and Seychelles groups until beyond the Saya de Malha bank; thence, direct for Mauritius. This is, however, generally a slower route than the other, and there is more danger of meeting with cyclonic disturbances.

The distance is about the same by both routes.

*Return route.*—Full-powered vessels should proceed as direct as possible round the northern end of Madagascar.

Low-powered vessels should proceed as direct as possible round the northern end of Madagascar.

*Note.*—Vessels bound to the north-western coast of Madagascar should always go round the northern end of that island; and those bound to the western coast, or to any ports on the African coast southward of Rio dos Bons Sinais, round the southern end.

**Seychelles to Colombo.**—Full-powered vessels should proceed direct through the One-and-a-half degree channel.

Low-powered vessels, from April to October, should proceed direct through the Eight-degree channel; or, pass through the more direct route offered by the Kardiva channel; but not at night, unless the entrance has been made before dark, or the latitude of the vessel is accurately and with certainty known.

From November to March, low-powered vessels should stand eastward in about lat.  $5^{\circ}$  S., cross the Equator in long.  $80^{\circ}$  or  $81^{\circ}$  E., and stand northward into the north-east monsoon, when they should make for and round the south-western end of Ceylon, and proceed up the coast, taking advantage of the land and sea breezes.

*Return route.*—Full-powered vessels, from April to October, should proceed direct through the One-and-a-half degree channel; distance, 1,650 miles.

From November to March, full-powered vessels should proceed through the Eight-degree channel.

Low-powered vessels, from April to October, should get a good offing, and then stand southward across the Equator into the south-east trade. They should stand southward of the Chagos archipelago and thence direct.

From November to March, low-powered vessels should pass through the Eight-degree channel, proceed westward through the north-east monsoon, and cross the Equator in about long.  $54^{\circ}$  E.

**Seychelles to Aden.**—Full-powered vessels should proceed direct round Capo Guardafui, but during the south-west monsoon Ras Hafún should be made before Capo Guardafui.

Low-powered vessels, from April to October, should steer direct for Ras Hafún and round Capo Guardafui, then proceed along the African coast until abreast Mait island, and then stand across the Gulf for Aden.

From November to March, low-powered vessels should cross the Equator in about long.  $61^{\circ}$  E., and proceed northward into the north-east monsoon; then stand for the Gulf of Aden, passing northward of Socotra.

*Return route.*—Full-powered vessels should proceed direct round Capo Guardafui.

Low-powered vessels, from April to September, should round Socotra, and stand south-eastward across the Equator. After losing the south-west monsoon, they should proceed southward into the south-east trade, and thence direct to the Seychelles.

From October to March, low-powered vessels should either steam



*Charts 1077, 1078.*

along the African coast until able to weather Capo Guardafui ; or else steer direct for Capo Guardafui, and having rounded it, proceed direct.

**Seychelles to Mauritius.**—Full-powered vessels should proceed  
5 direct.

Low-powered vessels, from April to October, should stand eastward as far as about long.  $70^{\circ}$  E., then proceed southward until well into the south-east trade, and then direct for Mauritius.

From November to March, low-powered vessels should run eastward  
10 past the Saya de Malha bank, then proceed southward into the south-east trade, and then direct for Mauritius as before.

*Return route.*—Full-powered steamers should proceed direct.

Low-powered vessels, from April to October, should proceed direct.

From November to March, low-powered vessels should keep rather  
15 westward of the direct route until in the north-west monsoon, and then as direct as possible.

**Aden to Mauritius.**—Full-powered vessels should proceed direct from Capo Guardafui, calling if necessary at Seychelles for fuel.

Low-powered vessels, from April to September, should pass north-  
20 ward of Socotra, run through the south-west monsoon, cross the Equator in about  $72^{\circ}$  E., or even run through the One-and-a-half degree channel, and make southing into the south-east trade, passing eastward of the Chagos group. Thence, they should proceed direct to Mauritius.

From October to March, low-powered vessels should proceed along  
25 the Arabian coast until able to weather Capo Guardafui, or steer direct for it, and from thence run through the north-east and north-west monsoons, crossing the Equator in about long.  $64^{\circ}$  E., and the parallel of  $10^{\circ}$  S. in about long.  $70^{\circ}$  E., and when in the south-east trade steer direct for Mauritius.

30 *Return route.*—Full-powered vessels should follow the most direct route.

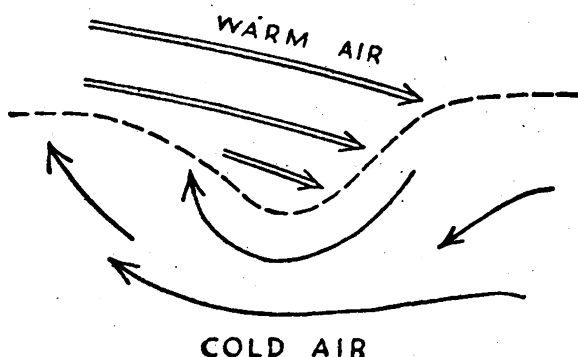
Low-powered vessels, from April to September, should pass westward of the Amirante islands, and thence direct to Capo Guardafui. They should then proceed along the African coast as far as Mait island before  
35 standing across for Aden.

From October to March, low-powered vessels should run northward through the south-east trade and north-west monsoon, cross the Equator in about long.  $61^{\circ}$  E., make northing into the north-east monsoon, and then steer direct for the Gulf of Aden, passing northward of  
40 Socotra if possible.

**METEOROLOGY.—Depressions.**—*Southern hemisphere.*—A depression is a region of the atmosphere where pressure is lower than elsewhere. It appears on the synoptic chart as a series of isobars roughly circular or oval in shape, surrounding an area of low pressure.  
45 It is characterised by unsettled weather and often strong winds. In the southern hemisphere the winds blow round a low pressure in a clockwise direction ; there is also a slight inward inclination across the isobars. Thus the well known rule for the southern hemisphere is that when an observer faces the wind, the lowest pressure is from 8 to  
50 12 points to his left.

According to the Norwegian theory of depressions, which has now been generally accepted, most depressions form at the boundary of two air currents of different temperatures and characteristics which are in juxtaposition, a tongue of warm air projecting into the cold air  
55 and the centre of the depression being at the tip of the tongue of warm

Fig. 1.



*A depression forming at the boundary of two air currents.*

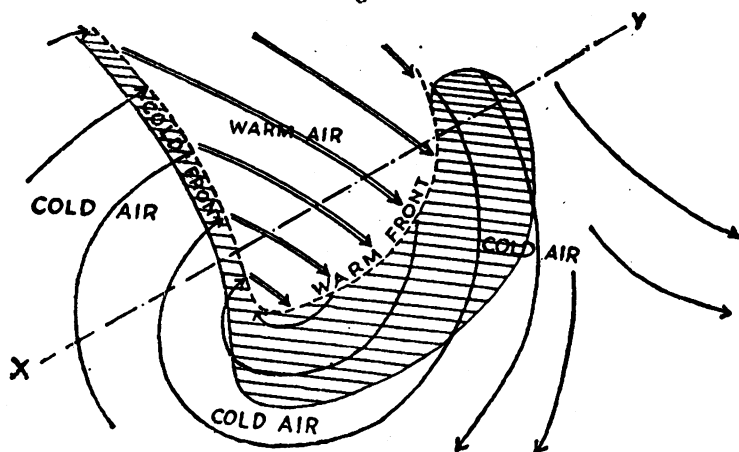
The double lines show the flow of the warm air, and the single lines the flow of the cold air.

air (Fig. 1). The disturbance so formed moves forward along the boundary of the two air currents. Thus in its early stages a depression has a warm sector; the boundaries between the warm and cold air streams are known as "fronts." At the front of the warm air stream, known as the "warm front," the warm air is rising gradually over the cold air; this causes condensation of the water vapour in the warm air, forming at first cloud and later drizzle or continuous steady rain. The cloud spreads out ahead of the warm front and the highest cloud, cirrus or mares' tails, is often about 500 miles ahead. At the rear boundary of the warm sector, known as the "cold front," the cold air is pushing under the warm air forcing the latter to ascend rapidly; this process is sometimes violent enough to produce squalls. The rapid ascent of the warm air causes the moisture to condense in the form of cumulonimbus (shower clouds), from which heavy showers fall (Figs. 2a and b). The warm sector is thus being gradually lifted up from the earth's surface. When this has occurred the depression is said to be "occluded," and the warm and cold fronts merge in a "line of occlusion" (Figs. 3a and b). When a depression has become occluded, it usually decreases in intensity and rate of travel, and gradually fills up. On the other hand, a depression which has a large warm sector is likely to be deepening, the winds associated with it may increase in force, and its rate of travel may increase. Depressions are usually travelling in a direction approximately parallel to the isobars in the warm sector.

Depressions may move in almost any direction, but they most often move from any one position to a position farther eastward; they tend to travel over the sea rather than over the land. Their rate of movement is very variable, and sometimes depressions are stationary for a time. Depressions vary very much in size; the smallest may have a diameter of less than 100 miles while the diameter of the largest may exceed 2,000 miles.

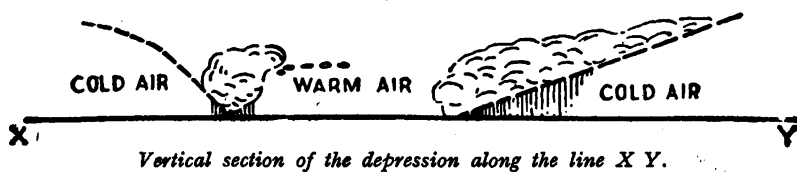
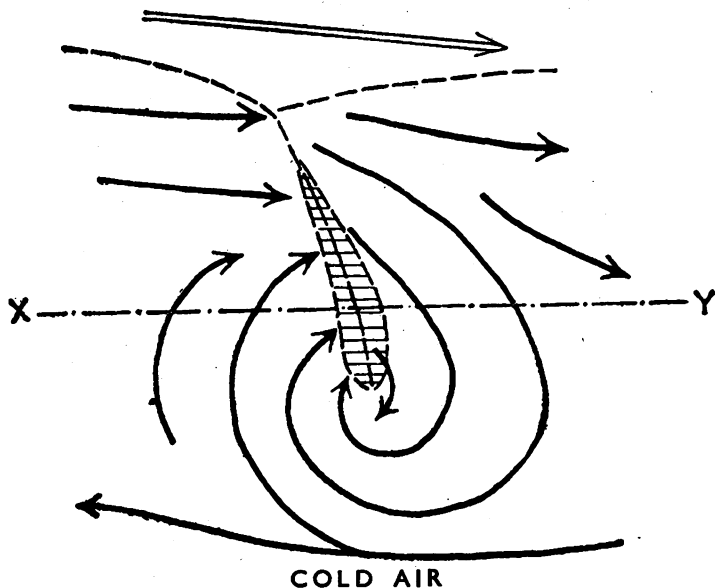
The approach of a depression is indicated by a falling barometer. In the southern hemisphere if the depression is approaching from westward and passing southward of the ship, clouds appear on the western horizon, the wind shifts to north-east or north and freshens, the cloud layer gradually lowers, and finally drizzle, rain, or snow begins. If the depression is not occluded, after a period of continuous rain or

Fig. 2a.

*Plan of a developed depression.*

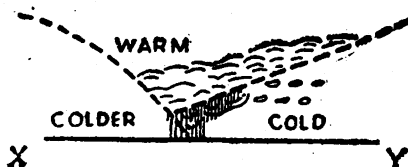
The double lines show the flow of the warm air, and the single lines the flow of the cold air. The shading shows the area where rain (or snow) is most probable.

Fig. 2b.

Fig. 3a.  
WARM AIR*Plan of an occluded depression.*

The shading shows where rain (or snow) may be expected near the occlusion.

Fig. 3 b.



*Vertical section of an occlusion of the cold front type.*

The air in front of the occlusion is warmer than the air behind it.

snow there is a backing of wind at the warm front, a rise of temperature and diminution of rain (or snow) in the warm sector, the visibility being moderate. The passage of the cold front is marked by the approach from westward of a thick bank of cloud, a further backing of wind to west or south-west sometimes with a sudden squall, rising 5 pressure, a fall of temperature, squally showers of rain, hail, or snow, and improved visibility (except during showers). The squally, showery weather with a further backing of wind and drop in temperature may recur while the depression passes. If the depression is occluded, the occlusion is preceded by the cloud of the warm front; 10 there may be a period of continuous rain mainly in front of and at the line of occlusion, or a shorter period of heavy rain mainly behind the occlusion, according as the air in front of the occlusion is colder or warmer than that behind it. There may be a sudden backing of wind 15 at the line of occlusion. Often another depression follows, in which case the barometer begins to fall again, and the wind veers towards north-west and north.

Near the region of lowest pressure lulls are sometimes experienced, but sudden changes are likely, and in a deep depression the wind may increase in strength very rapidly perhaps to gale force, as the barometer 20 begins to rise.

If a depression travelling in an easterly direction is passing northward of the ship, the winds in front of it are easterly, and they veer through south-east to south or south-west; changes of direction are not likely to be so sudden as on the northern side of the depression. 25 In the rain area there is often a long period of continuous rain and unpleasant, thick weather with low cloud. In winter, in the colder regions, the weather is cold and raw, and precipitation is often in the form of snow.

Sometimes in the air circulation of a large depression, usually on 30 the equatorial side and often on the cold front, a secondary depression develops, travelling in the same direction as the primary but usually more rapidly. The secondary often deepens while the original depression decreases in intensity. In the region between the primary and the secondary depressions, the winds are not as a rule strong; 35 but on the further side of the secondary, usually the equatorial side, winds are likely to be strong, and they may reach gale force. Thus the development of a secondary depression may cause gales at a greater distance from the primary depression than anticipated, while there may be only light winds where gales were expected. 40

The above is a brief general description of depressions and the associated weather in temperate latitudes. It must be emphasised, however, that individual depressions in different localities differ considerably from one another, according to the characteristics (especially

the temperature and humidity) of the air currents of which they are composed, and the nature of the surface over which they are travelling.

**General conditions.**—The area covered by this volume is in the southern hemisphere, and shows a change in climate from northward to southward, from equatorial, through tropical, to sub-tropical and temperate conditions. The change takes place smoothly and gradually, as there is no land mass present of sufficient size to cause irregularity.

The highest temperatures in July are near the equator; and in January in lat.  $10^{\circ}$  S. The lowest temperatures are in the extreme south at all times of year. In January the mean temperature on the equator is about  $81^{\circ}$ , and in lat.  $10^{\circ}$  S. about  $82^{\circ}$ , falling to  $73^{\circ}$  in lat.  $30^{\circ}$  S., and to  $60^{\circ}$  in lat.  $40^{\circ}$  S. In July temperature is still  $81^{\circ}$  on the equator, falling gradually to  $53^{\circ}$  in lat.  $40^{\circ}$  S.

In the equatorial regions, between the equator and lat.  $10^{\circ}$  S., the main feature of the weather is the prevalence of light winds, rarity of gales, apart from occasional squalls with cloud and rain. There is no fog at sea within this area.

Within the trade wind belt southward weather is generally fine at all times of the year, although there are occasional belts of cloudy and probably showery weather, due to the passage of cold fronts. Tropical cyclones are sometimes experienced; they are most likely to be encountered westward of long.  $70^{\circ}$  E. Visibility is good except during rain storms; fog or mist is usually only experienced in the higher parts of the islands.

Gales, apart from those associated with tropical storms, are mostly due to an intensification of the trade wind, and are most often experienced in the area  $15^{\circ}$  S.– $25^{\circ}$  S.,  $70^{\circ}$ – $100^{\circ}$  E. during the winter of the southern hemisphere.

Southward of the southern limit of the trade in about lat.  $28^{\circ}$  S.– $30^{\circ}$  S. weather becomes progressively worse as the zone of westerlies is approached. The frequency of gales increases as does also that of fog and poor visibility.

**Pressure.**—Average pressure is highest in the belt between lat.  $30^{\circ}$  S. and lat.  $35^{\circ}$  S.; this belt consists essentially of a succession of anticyclones which move across the ocean from west to east throughout the year. Southward, pressure falls rapidly to the low-pressure area situated southward of lat.  $40^{\circ}$  S. Northward of the anticyclonic belt, pressure falls more gradually towards the equator. The mean isobars run along the parallels of latitude at all times of the year, but the whole system of high and low pressure moves northward and southward with the sun.

Fig. 1, page 37, shows the average pressure distribution in August, the typical month of the winter season, June to September. The belt of high pressure is now at its most northward position. Pressure falls from 1026 mb. in lat.  $30^{\circ}$  S. to 1,016 mb., in lat.  $10^{\circ}$  S., and continues to decrease northward, giving a continuous gradient across the equator towards the great low-pressure region over North-West India. Southward of the high-pressure belt pressure again falls, but more steeply than it does northward.

The pressure distribution for February, typical of the southern summer, is shown in Fig. 2, page 37. The high-pressure region, now less intense than in winter, has moved southward. An axis of low pressure runs from the northern part of the Mozambique channel eastward across the ocean in about lat.  $10^{\circ}$  S. Pressure rises slowly again northward towards the high pressure area situated over Asia.

Diurnal variation of pressure in the inter-tropical regions is large compared with that in temperate latitudes. Thus in the South Indian ocean the mean variation is 2.9 mb. between the equator and lat.  $10^{\circ}$  S., about 2.6 mb. between lats.  $10^{\circ}$  S. and  $20^{\circ}$  S., and about 2.2 mb. from lat.  $20^{\circ}$  S., to Lat.  $30^{\circ}$  S.

From the equator to lat.  $10^{\circ}$  S., maximum pressure occurs between

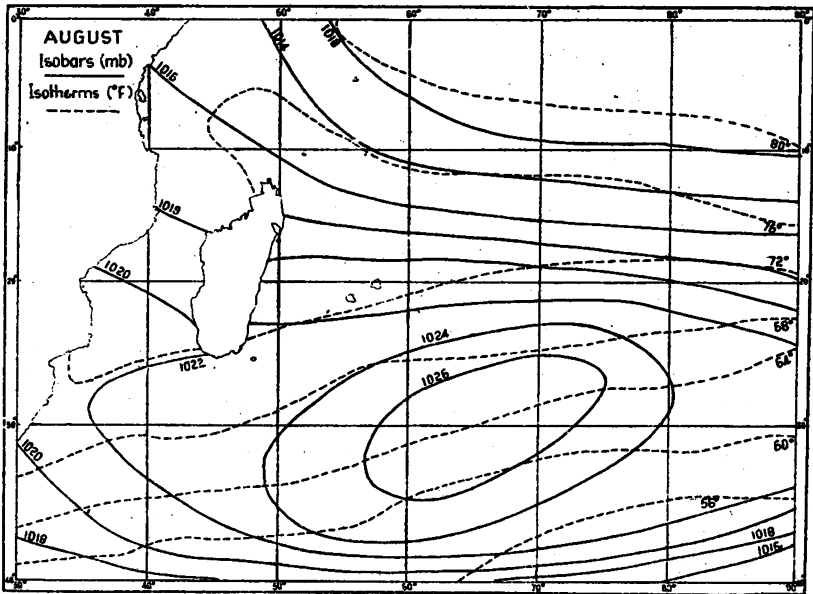


Fig. 1.

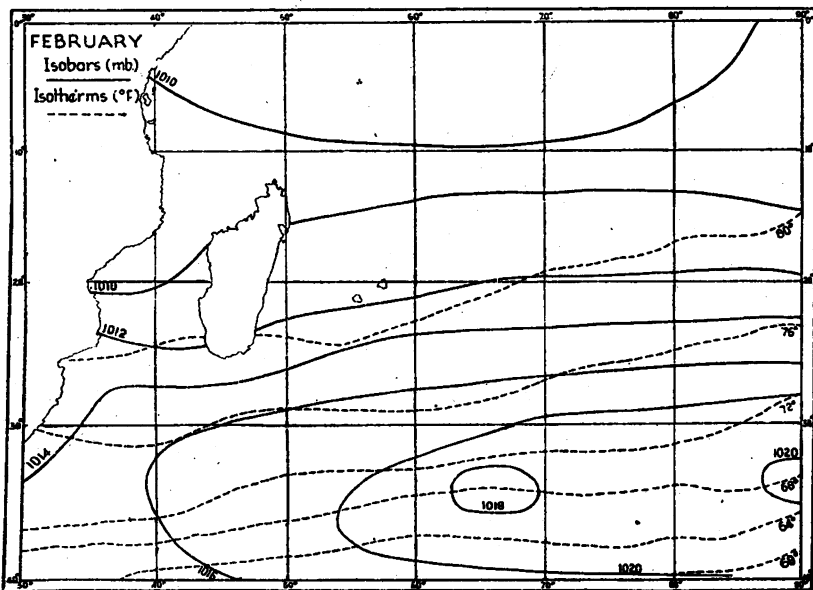
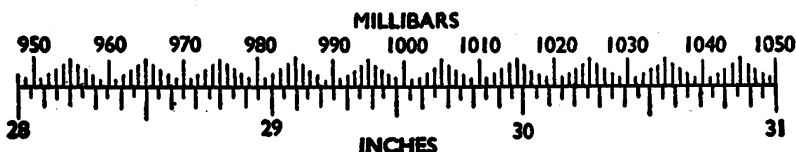


Fig. 2.

0900 and 1000, and 2200 and 2300, and minimum at 1600 and 0400. From lats.  $10^{\circ}$  S. to  $20^{\circ}$  S. maximum pressure occurs between 0900 and 1000 and at 2200, and minimum at 1600 and between 0300 and 0400. Corrections in millibars to be applied to the pressure observed at sea to bring it to the mean of the day are given in the following table :—

Local time	0	1	2	3	4	5	6	7	8	9	10	11
$0^{\circ}$ S.— $10^{\circ}$ S.	-0.7	-0.2	0.2	0.6	0.7	0.5	0.1	-0.5	-1.0	-1.3	-1.3	-1.1
$10^{\circ}$ S.— $20^{\circ}$ S.	-0.4	0.0	0.4	0.7	0.7	0.4	0.0	-0.5	-1.0	-1.2	-1.2	-0.9
Local time	12	13	14	15	16	17	18	19	20	21	22	23
$0^{\circ}$ S.— $10^{\circ}$ S.	-0.5	0.2	0.9	1.4	1.6	1.5	1.1	0.5	-0.1	-0.7	-0.9	-0.9
$10^{\circ}$ S.— $20^{\circ}$ S.	-0.3	0.3	0.9	1.3	1.4	1.2	0.8	0.2	-0.3	-0.7	-0.9	-0.7

The following diagram gives the equivalent of millibars in inches of mercury and vice versa :—



**Winds.**—Three principal winds occur in this area ; the south-east trade the north-west or cross monsoon, and the westerlies.

The diagrams, on page 39, show by an arrow the direction and constancy of the wind in each  $5^{\circ}$  square. The direction of the arrow is the mid-direction of the quadrant which has the greatest number of winds ; this quadrant is not necessarily bounded by cardinal points ; only winds of Beaufort force 3 and above are taken into account. When two distinct quadrants each show a predominant wind two arrows are drawn. A star denotes that there is no predominating wind in the square. The constancy is shown according to the following scale :—

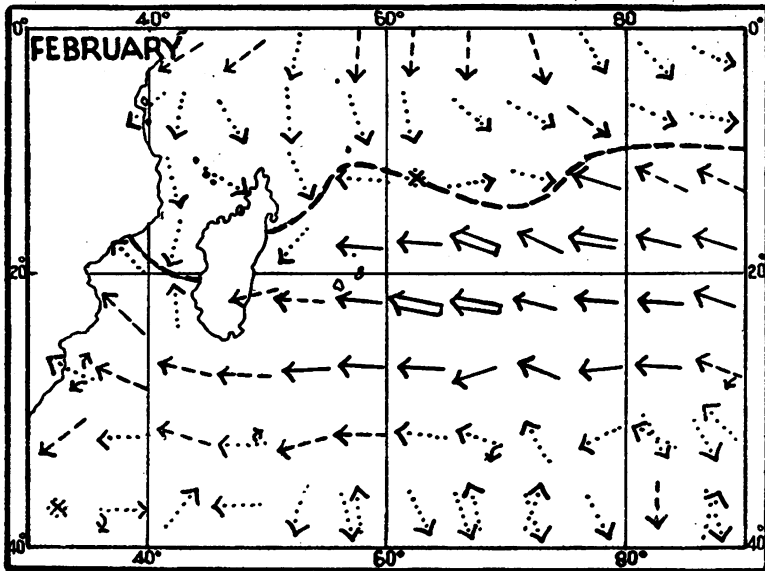
\* 0-20% <..... 21-40% <----- 41-60%  
 <----- 61-80% <===== 81-100%

In the diagram for February the pecked line indicates the approximate northern limit of the south-east trade.

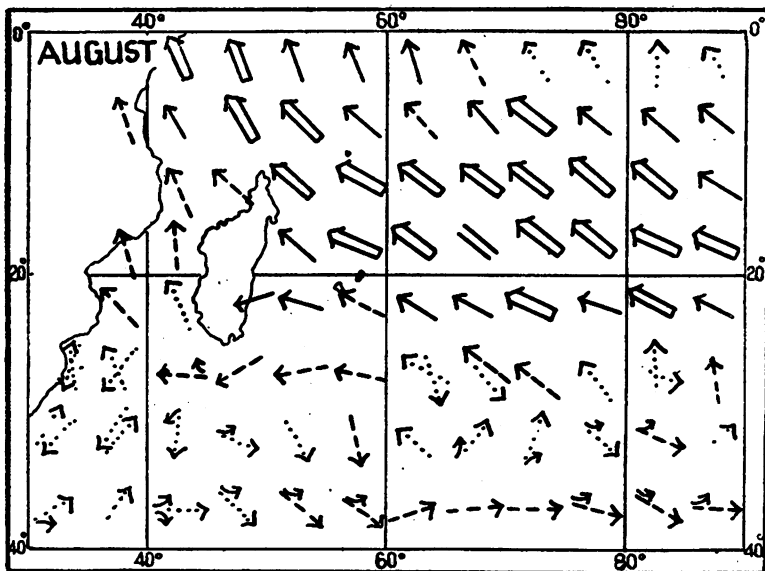
**South-east trade.**—This wind blows throughout the year but varies in steadiness and extent. The approximate northern limit for February is shown by the pecked line in Fig. 1, page 39. In August when the trade wind belt is widest the northern boundary is on or near the equator (see Fig. 2, page 39). Northward of lat.  $10^{\circ}$  S. the wind is sometimes known as the south-east monsoon. Between May and September the average strength of the trade wind is force 5 ; during the rest of the year the average force is between 4 and 5. The pecked lines in Figs. 1, 2, 3, and 4, page 40, show for four typical months, the percentage frequency of winds of force 4 or more.

**North-west or cross monsoon.**—From December to March, when the north-east monsoon prevails northward of the equator, north-westerly winds blow between the equator and lat.  $10^{\circ}$  S., see Fig. 1, page 39 ; these winds are not nearly so steady as the monsoons of the northern hemisphere, and, westward of long.  $65^{\circ}$  E., are often light and inconstant, with squalls and calms.

**Westerly winds.**—Southward of the southern limit of the south-east trade, indefinite winds and calms prevail in the region of high pressure centred on lats.  $30^{\circ}$  S. to  $35^{\circ}$  S. Still farther south, westerly winds predominate. The force and persistence of the winds in these



PREDOMINANT WINDS — Fig. 1



PREDOMINANT WINDS — Fig. 2

latitudes have so impressed navigators that they have become known as the "Brave West Winds," and the zone between lat. 40° S. and lat. 50° S. has acquired the name of the "Roaring Forties." The winds are not constantly from westward, as was once thought to be the case. The westerly circulation is the result of a continuous succession of barometric depressions and anticyclones which move on an approximately west to east track. The winds are consequently variable, but



winds from westward or north-westward predominate. On the whole the strength of the wind increases with the latitude.

**Gales.**—The percentage frequency of gales in the four months February, May, August, and November is given in Figs. 1, 2, 3, and 4, 5 below. The rarity of gales between the equator and lat.  $10^{\circ}$  S. is well shown; the few that do occur are probably short-lived squalls. Gales become more frequent in the trade wind belt, especially between May and September. Southward there is a further increase as the region of westerly winds approaches. In lat.  $40^{\circ}$  S. from about 6 to 12 days of gale a month may be expected between March and November. Gales may be from any direction, but those from westerly or north-westerly directions predominate.

**Squalls.**—Within the area  $0^{\circ}$  to  $10^{\circ}$  S., weather is frequently disturbed by squalls with heavy rain, during which the wind force may be

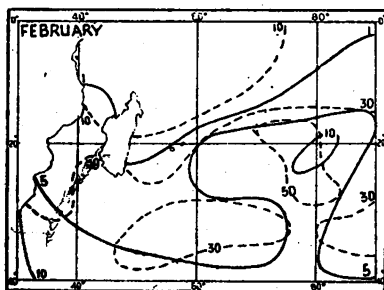


Fig. 1.

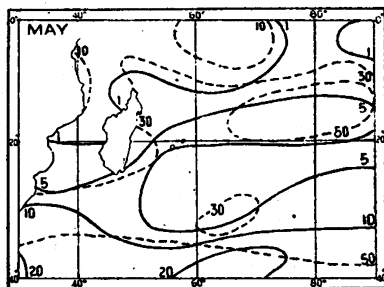


Fig. 2.

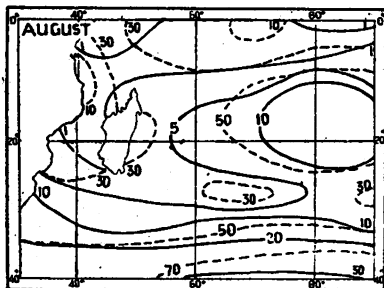


Fig. 3.

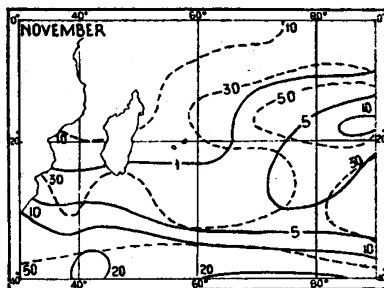


Fig. 4.

(a) PERCENTAGE FREQUENCY OF GALES (WINDS OF FORCE 7 OR MORE) ———

(b) PERCENTAGE FREQUENCY OF WINDS OF FORCE 4 OR MORE - - - - -

6 or 7; these squalls are more likely to occur during the months November to April, and usually, though not always, accompany winds from a north-westerly direction.

**Land and sea breezes.**—Near the coasts the wind is influenced by the land and sea breezes, and often the actual wind experienced is not that which would be expected from the general pressure gradient existing. During the day time in suitable conditions a sea breeze tends to blow onshore. It usually rises gradually during the forenoon, but sometimes its onset is sudden; at times it breaks suddenly as late as 1400; it reaches its maximum development in the afternoon, usually from about 1500 to 1700; it decreases in the evening, and dies away around sunset. At some time after 2200 a light off-shore wind, the land breeze, may spring up, and last until the morning; sometimes the nights are calm, and the land breeze is not felt until

the early morning. Except in regions where the land slopes steeply to the coast, the sea breeze is usually more strongly developed than the land breeze. The effect of the sea (or land) breeze may be to deviate the wind due to the general pressure gradient, to reinforce it, to neutralise it, and reduce it to calm, or even to reverse it; in quiet anticyclonic conditions the land and sea breezes may be the dominating winds. 5

The land and sea breezes are caused by the unequal heating of the land and water under the influence of the sun's radiation. During the day time the land is warmed up, the air over the land becomes warmer than the air over the sea, and there is a movement of air onshore; at night the land is cooler than the sea, and the air movement is in the opposite direction. The conditions favourable to the maximum development of land and sea breezes are bright sunny days and clear nights with a weak pressure gradient and little general wind. 10 15

Land and sea breezes are much influenced by topography, and vary considerably along the coasts; it is, therefore, necessary to study each part of the coast to forecast the development of these breezes accurately.

The effect of the land and sea breezes is not usually felt more than 20 miles from the coast, and often it does not extend beyond 10 miles.

**Tropical cyclones.**—This is the name given to the tropical revolving storms of the Indian ocean. Tropical cyclones occur in the South Indian ocean from November until mid-May; in other months they are extremely rare, and so far as is known are never experienced in August. These cyclones occur when the south-east trade has retreated southward of the equator, and when north-westerly winds are prevalent over the northern part of the South Indian ocean. The cyclones usually form somewhere between lat.  $10^{\circ}$  S. and lat.  $15^{\circ}$  S., and comparatively often between lat.  $15^{\circ}$  S. and lat.  $20^{\circ}$  S. Between the equator and lat.  $5^{\circ}$  S. cyclones occur only very rarely. 20 25 30

The following table from observations at the Royal Observatory, Mauritius, between 1848 and 1935, gives the average number of cyclones per year whose centres pass through the area lat.  $0^{\circ}$  to  $30^{\circ}$  S., long.  $50^{\circ}$  to  $70^{\circ}$  E. 35

Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	Year
0.0	0.1	0.2	0.6	1.3	1.2	0.8	0.4	0.2	4.8

An average frequency of about 5 cyclones a year is thus indicated; but the number of cyclones in any one year varies considerably, in some years there may be none and in other years several more than the average.

Westward of long.  $50^{\circ}$  E., as far as the Mozambique channel, cyclones are less frequent, averaging about 3 a year. 40

The following table gives the average number of tropical cyclones which cross Madagascar.

Nov.	Dec.	Jan.	Feb.	March	April	May	Year
0.1	0.4	0.9	0.9	0.6	0.2	0.0	3.1

These values include cyclones during which the wind speed exceeded 27 knots, and the pressure fell below 1,000 mb., as well as less severe disturbances. 45

Eastward of long.  $70^{\circ}$  E. information about cyclones depends on reports from isolated ships, and therefore many may have passed unrecorded. They, nevertheless, appear to be less frequent in this part of the ocean. 50

Cyclones occur most often between December and March. One has been known to form in lat.  $4^{\circ}$  S. as early as September, and one near the Cocos islands as late as July.

The official cyclone season in Mauritius, during which special reports are received, lasts from November 1st to May 15th.

The usual track of a cyclone is west-south-westward, curving gradually to south-south-west, through south, to south-east. Some storms however, travel in a westerly direction.

The point of recurvature, the most westerly point reached by a cyclone, has its average position in lat.  $21^{\circ}$  S., the subsequent tracks being south-eastward. This latitude shows a certain seasonal variation, as is shown in the following table based on records of 89 storms whose point of recurvature was definitely established.

	Nov.	Dec.	Jan.	Feb.	Mar.	April	May
Number of Cases	4	12	28	20	13	8	4
Mean latitude of recurve, S. lat.	$17.0^{\circ}$	$17.0^{\circ}$	$22.2^{\circ}$	$22.2^{\circ}$	$20.8^{\circ}$	$15.0^{\circ}$	$14.0^{\circ}$
Mean longitude of recurve, E. long.	$76.0^{\circ}$	$67.0^{\circ}$	$60.0^{\circ}$	$63.0^{\circ}$	$63.5^{\circ}$	$74.5^{\circ}$	$75.0^{\circ}$

The most southerly and westerly point of recurving is reached in the middle of the cyclone season. The area in which cyclones may be expected extends in approximately a triangular shape between Australia, the Lesser Sunda islands, and Madagascar or Africa. At the Seychelles group and the Chagos archipelago they are of very rare occurrence. A brief indication of the tracks as the season advances is as follows:

In October the storms have occurred mostly in the neighbourhood of Mauritius and the Seychelles, but have been met with westward of Cocos island and eastward of Rodriguez island.

In November and December most of the storms originate between lat.  $5^{\circ}$  S. and lat.  $15^{\circ}$  S., and between Madagascar and long.  $70^{\circ}$  E. On the other hand they may occur much farther eastward, especially in November. The more usual track is eastward of Madagascar, over Mauritius and Rodriguez island. The December storms sometimes traverse the Mozambique channel.

In January, February, and March the tracks are in general very similar. Comparatively few originate eastward of long.  $90^{\circ}$  E., the area of maximum occurrence being eastward of Madagascar, over the islands of Mauritius, Réunion, and Rodriguez. Occasionally storms of January and February penetrate into Madagascar or pass down the Mozambique channel.

In April the tracks are usually somewhat eastward of those in the earlier months and many of them pass well eastward of Mauritius. The noted storm of April, 1892, was exceptional, and passed directly over Mauritius. Occasional storms in this month originate very far eastward, between long.  $80^{\circ}$  E. and long.  $90^{\circ}$  E.

In May the easterly retreat is continued, the tracks seldom passing westward of Rodriguez island, but at the end of May, 1916, a well-defined storm of moderate intensity formed in lat.  $10^{\circ}$  S., long.  $65^{\circ}$  E., and moved south-south-westward, passing eastward of Mauritius; it recurved south-eastward near lat.  $20^{\circ}$   $30'$  S. There is no other record of a cyclone having travelled westward of Rodriguez island after April 29th.

The average speed of travel of tropical cyclones is from 5 to 10 knots northward of lat. 20° S. After recurving the rate of travel usually increases with increasing southerly latitude. Speeds of about 20 knots or more are fairly common in lat. 35° S.

The most important indications of the approach of a tropical storm and practical rules for avoiding them are given on pages xxvii-xxx of the section on "General Navigation."

On the coast of Madagascar the precursory signs of a cyclone may be observed without the storm following, it having recurved southward or south-eastward before reaching the coast, but notice of its vicinity may be indicated both by an unusual fall of the barometer and by the formation of heavy rollers on the coast. These rollers sometimes occur during the fine season as the result of a distant gale at sea when fine weather prevails on the coast, but during the cyclone season their occurrence must be considered with other premonitory symptoms of disturbance, and from December to April they may be regarded as almost certain fore-runners of approaching bad weather.

Rollers are not often felt northward of Baie d'Antongil in Madagascar, but at the islands of Réunion, Mauritius, and Rodriguez they rise to a great height, and break violently on the coasts. At Ile de la Réunion it is said the rollers as an indication of an approaching cyclone are of almost the same value as the barometer and state of the sky. Sometimes during an evening preceding a cyclone the weather is magnificently fine, while the sea already feels its influence; thus a rapid current passing a vessel at anchor, and a long swell arising, rolling in, and breaking on the shore should be a warning to that vessel. Rollers setting in heavily from Saint-Pierre to Saint-Benoît, and advancing from place to place until they arrive at Saint-Denis, is an almost certain sign, often preceding a cyclone by some days.

*Cyclone in Mozambique channel.*—One of the records of storms in this channel is available from an account furnished by the s.s. *City of Delhi*, which left Baia de Lourenço Marques on March 18th, 1910. By noon on the 20th she was in lat. 22° 45' S., long. 37° 26' E., the wind was fresh from south-eastward, and the weather sunny and generally of the normal type pertaining to that part of the world.

Towards 1600, however, the sky became overcast, and the wind began to increase in strength, and by 0800 on the 21st there was every evidence of a cyclonic storm in the proximity of the vessel.

During the afternoon of the 21st the wind continued to strengthen, the sea became dangerously high, and terrific squalls with rain prevailed. The wind veered from east by north to south-east, and by 1700 was blowing with hurricane force. At 1930 the vessel approached closely to the centre of the storm, and the wind and sea went down nearly instantaneously, although the "roar of the storm" could be heard all around. The sea at the centre "was almost calm with a confused swell, but with no broken water; the wind was very light and shifting rapidly, and at times the smoke from the ship's funnel rose vertically."

The vessel crossed the centre, steering north-eastward, and then drifted west-south-westward. At 0900 on the 22nd the wind moderated, and the vessel was eventually put on a north-east-by-east course with her engines going at full speed. By 0900 on the 22nd both wind and sea were increasing; fierce squalls were frequent, and by next morning, the 23rd, the conditions of wind, weather, and sea were still more unfavourable. At 1100 the squalls were terrific, the sea high and dangerous, and heavy rain was falling.

Five hours later the wind had again reached hurricane force, the sea was mountainous, and heavy dark clouds were drifting across the sky at a low altitude; there was also a dense haze. The vessel was again nearing the storm centre. At 1800 on the 23rd the lowest barometric reading, 965 mb. (28.50 in.) was reached; the vessel was then on the eastern verge of the central area. The wind and sea again subsided, and there was a lull for about half-an-hour. Soon after 1900 the wind again increased suddenly and its force was very high; the sea, however, was less dangerous, and the clouds more detached; the barometer had begun to rise. The wind increased in force from east-north-eastward until about 0630 on the 24th. The vessel steered northward at full speed, and by 0820 had left the disturbance behind her.

By noon she was in lat.  $20^{\circ} 40' S.$ , long.  $38^{\circ} 38' E.$  Throughout the storm the clouds were of a dull, leaden hue, heavy and dark, torn, and in piled-up masses on the outer circle. It became hazy as the centre was approached, and the clouds seemed to get lower and lower until they were apparently only a little higher than the ship's mastsheads, while the haze became denser. On the inner circle the radius of vision was small, but in the vortex itself it was wonderfully clear.

The diameter of the vortex, estimated by combining the speeds of the vessel and the cyclone, was about 20 miles; the speed of the storm centre itself was about 6 knots,  $215^{\circ}$ . Lightning was only reported once, on the night of the 21st when the centre was crossed.

*Cyclone near Ile de la Réunion.*—The cyclone of February 3rd to 8th, 1932, originated north-eastward of Madagascar, whence it moved south-eastward at a rate of about 7 knots, and reached Ile de la Réunion on the 4th. Observations taken at Ile de la Réunion show that the inner ring of hurricane winds was quite small, the approximate diameter being from 45 to 50 miles, and hence it was not until a few hours before the centre struck the island that there were any indications of the great intensity of the centre. Thus an observation taken by a vessel in the harbour at Port des Galets at 0400 gave pressure 1004 mb. (29.65 in.) falling slightly; wind north-easterly and freshening. At 0700, however, pressure had fallen to 996 mb. (29.41 in.), and the north-easterly wind had increased to force 8. From this time conditions got rapidly worse, pressure fell very rapidly, winds were of hurricane force, and the rain was very heavy. The lowest pressure recorded was 953 mb. (28.14 in.) between 1015 and 1020. When the centre had passed, the wind backed towards north-westward and began to decrease, and by 1300 all was quiet again. The greatest wind force was experienced before the centre passed. The pressure gradient in the inner ring of hurricane winds was very steep. In just over three hours, 0700–1015, the pressure fell 43 mb. (1.27 in.). In a matter of a few hours nearly one hundred persons were killed, and the damage caused to buildings, crops, etc., was very considerable.

**Effect of a tropical revolving storm on the current.**—See page 19.

**V-shaped troughs.**—The high-pressure belt centred on lat.  $30^{\circ} S.$  consists of a succession of anticyclonic systems which travel from west to east across the ocean throughout the year. The interval between successive high pressures varies but, on the average, they follow each other about every 6 to 7 days. Very well-marked low-pressure systems separate these anticyclones; they are generally in the form of inverted V-shaped depressions, along which lies a front whose passage is marked

by an abrupt change from northerly winds to westerly or southerly winds.

The areas of these depressions are large, and the centres of the majority of them pass southward of lat.  $50^{\circ}$  S. A wind in the northern sector, beginning between north and north-west, may be expected to back westward and freshen, frequently backing suddenly to south-westward, from which quarter the strongest blow will probably come, with a rising barometer. A vessel steering eastward on the northern side of a depression may hold a following wind for many days, and after losing the benefit of one cyclonic system will probably after a day or two of variable winds be overtaken by another and repeat the process.

In accordance with the well-known cyclonic law as to the wind being strongest as the centres of depressions are approached, and most rapid in its changes of direction, it follows that a vessel in about lat.  $40^{\circ}$  S. may expect more steady westerly winds and less sea than if farther southward. Hence it is recommended that, when crossing the South Indian ocean, this parallel be not exceeded during the southern summer, nor the 35th in the winter, if westerly winds without an undue risk of gales are desired. An even lower latitude, say  $35^{\circ}$  S. to  $30^{\circ}$  S., will be accompanied by lighter winds, which may be desirable in certain classes of ship when westward bound. As a shortening of distance is effected by an approximation to the great circle track in a passage to Australia, vessels sometimes adopt it, but frequently at the cost of much straining to the ships and anxiety to their captains.

Should the area of lowest pressure of any system be farther northward than usual, and thus northward of a ship's track, which is occasionally but not often the case if the 40th parallel be adhered to, the wind will shift eastward instead of westward, and a hard easterly or south-easterly gale will probably be experienced; this is of course much more likely to occur in adopting the great circle route than in running along, or northward of, the 40th parallel.

Generally speaking, the relation between wind direction and barometer changes are as follows:—With easterly, north-easterly, and northerly winds the barometer falls; with north-westerly winds it ceases to fall and begins to rise; with westerly, south-westerly, and southerly winds it rises, and with south-easterly winds it ceases to rise and begins to fall.

**Sea temperature.**—The annual variation of sea surface temperature is fairly regular, on the equator the maximum temperatures occur in April, but southward of lat.  $18^{\circ}$  S. in February and March. The minimum sea temperatures occur in August and September over the whole region.

Sea surface isotherms for February and August are shown in Figs. 2 and 1, page 37.

Isotherms run roughly in an easterly and westerly direction; the lower sea temperatures are found some  $5^{\circ}$  or  $6^{\circ}$  nearer the equator in the eastern part of the region than in the western part.

**Visibility.**—Within  $30^{\circ}$  of the equator visibility is generally good except during rain storms when it may become temporarily very much reduced. Southward of the 30th parallel of south latitude the frequency of poor visibility (less than 2 miles) gradually increases with latitude, becoming likely on perhaps 5 days a month southward of the 40th parallel.

**Local weather.**—Seychelles group, Amirante isles, Farquhar group, and Agalega islands.—Winds.—Winds are from south-

eastward and eastward from mid-April to mid-November. Although sometimes referred to as the south-east monsoon, these winds form the extension northward of the south-east trade. The average speed increases from about 3 knots in April to about 10 knots in August, after which it decreases to 4 knots in November.

Down currents of considerable strength are said to be found to the lee of the hills in the north-western part of Mahé at this season.

The north-west monsoon predominates from mid-November to mid-April, and as the monsoon is less steady than the trade the frequency of north-westerly winds does not exceed 40 per cent. of the observations. The average speed of the wind is 5 knots over the whole season, but in December and January the wind speed exceeds 10 knots in only about 10 per cent. of the observations. Calms are frequent, although there may be violent squalls at times.

There are pleasant sea breezes throughout the greater part of the year.

**Temperature.—Humidity.**—The temperature is uniform throughout the year. The mean daily maximum and minimum temperatures vary from 85° and 78° in April to 81° and 76° in August. Extreme temperatures do not rise above 89°, or fall below 68°.

Relative humidity is high, showing little monthly or daily variation. It is highest in December and January, when the weather is reported to be close and more unpleasant than at other times of year.

Wet bulb temperature rises to an average of 78° in the afternoons in April and May.

**Cloud.**—The average annual amount of cloud is  $\frac{6}{10}$ , with hardly any variation from month to month. Diurnal variation also appears to be slight, but on land there is always a little less cloud in the morning than in the afternoon.

**Rainfall.**—At or near sea level the average annual amount of rain is 96 in., but in the hills above 2,000 feet (609m) it probably exceeds 150 in.

November to March is the wet season, with most rain falling in January, when the average is 16 in. Rain falls mostly in showers which are sometimes heavy, 0.4 in. or more falling on from 4 to 10 days a month at Mahé. July and August are the driest months with an average fall of from 2 to 3 in., in scattered showers.

Rain is more probable at night and in the early morning except on the sheltered sides of the larger islands where it is more likely in the afternoon.

**Visibility.**—Visibility may fall below 2 miles during heavy rain.

**Local weather.—Chagos archipelago.—Winds.**—The south-east trade wind prevails from April to October and sometimes into November; it blows with persistence from June to September, when it is shown in more than 60 per cent. of the observations. Calms are very rare. From June to August the average speed of the wind at Diego Garcia is from 4 to 6 knots.

The archipelago lies on the southern limit of the north-west monsoon, and winds at this season are from between north-east, through north-west, to west. On the average the wind speed at Diego Garcia is from between 3 and 4 knots, rising to 6 knots in February.

Cyclones are of very rare occurrence.

**Temperature.—Humidity.**—Temperature varies little throughout the year, and rarely exceeds 88°, or falls below 71°. The weather is coolest when the south-east trade is at its strongest; between June and September maximum day temperatures average 82° to 83°, and

night temperatures fall to about 76°. During the remainder of the year the temperatures are some 2° higher.

Relative humidity is high, especially during the warmer part of the year, which for this reason is said to be very trying to Europeans.

**Cloud.**—The average annual amount of cloud is just over  $\frac{1}{10}$ . Skies are clearest during the south-east trade season, when the average amount is from  $\frac{1}{10}$  to  $\frac{5}{10}$ . In the warm season skies are slightly cloudier. 5

**Rainfall.**—Normally the dry season lasts from June to September and the wet season from October to March. Rain falls on most days but may be limited to a short shower; on the other hand droughts lasting a month have been occasionally recorded. 10

Rain is probably more likely to fall at night and in the early morning than at other times.

**Earthquakes.**—Shocks are felt occasionally. 15

**Note.**—Values of meteorological elements are available for a short period only.

**Local weather.**—**Iles Comores.**—**General conditions.**—Iles Comores are slightly cooler than the mainland of North-West Madagascar. Rainfall varies from 40 in. to 100 in. a year, depending upon elevation and aspect. May to October is the drier part of the year, although on mountainous islands there is appreciable rain. November to April is the wet season; much of the rainfall is of the thunderstorm type, although on occasion there may be prolonged rain with very low cloud. 20 25

Visibility is probably good except during moderate or heavy rain.

Tropical cyclones occasionally reach these islands, *see* page 41.

**Local weather.**—**Mozambique channel.**—**General remarks.**—The seasons here are distinguished as those of the northern and southern monsoons, but the winds do not blow with the same regularity as farther northward, and gradually lose the character of monsoons altogether towards the south, where they are an off-shoot from the permanent south-east trade. The northern monsoon begins in September or October, the southern monsoon in March or April, and the change of season is generally accompanied by squally weather. Southward of lat. 20° S. the northern monsoon is not felt, and winds become variable, southerly to south-easterly winds being the most prevalent. 30 35

**Northern monsoon.**—The northern monsoon from its beginning to nearly the end of December is light and variable, with smooth water and usually fine weather; the wind, as the southern monsoon dies away, veers gradually, and westerlies and calms prevail until the northern monsoon becomes established in October, though it is really only during November and December that the prevalence of north-easterly winds deserves the name of monsoon, and even then westerly winds are not rare. Towards the end of December the monsoon becomes strong, and continues blowing with some force until about the beginning of February, at which time, in the southern part of the channel, the southerly wind begins to make itself felt, and about the end of February it is fully established, though not attaining force until April. 40 45

Near the Mozambique coast, from and after December, calms, variable winds, and rains occur, although in mid-channel it is usually fine with a fresh breeze. During the northern monsoon, the southerly wind which prevails at the southern end of the channel often reaches gale force, producing a heavy sea; such winds commonly make their way northward, overcoming the monsoon even as far as Iles Comores, and blow with about force 7 of the Beaufort scale. This weather does 50 55



not last long, and is usually preceded by heavy banks of cloud southward, with gloomy weather.

**Southern monsoon.**—The southern monsoon blows from between south-south-east and south-south-west between Ile Europa and Iles Comores, obtaining its greatest westing in May and June; from July it gradually veers eastward; in September, and from then until November, calms and light winds are prevalent until the northern monsoon is again established. The southern monsoon is considered the fine weather and healthy season, and is generally free from gales, but there is much more wind and sea at this time in the Mozambique channel than during the northern monsoon, and vessels proceeding southward frequently encounter a wind with a force of about 7 of the Beaufort scale and a heavy sea.

In the evening, within 20 miles of the coast of Madagascar, lighting and thick banks of clouds with a threatening appearance are common but generally harmless.

**Local weather.—Madagascar.—Winds.**—The south-east trade wind prevails most of the year, except in the north-western and northern regions of the island where the north-west monsoon is experienced in the hot season. The mountainous interior of the island divides the trade wind into two branches, one from north-eastward towards the southern end of the island, and one from east-south-east, through east, to north-east, round the northern end.

The frequency of tropical cyclones is given on page 41.

**North-western coast.—Cap d'Ambre to Maintirano.—Winds.**—This coast is sheltered from the south-east trade, except from May to October, when it is strong enough to penetrate through the gaps in the mountains to the north-western coast; reinforced by the land breeze, it then blows strongly down the valleys into some of the deep bays and inlets along the coast. The trade wind may blow in this way for several days without interruption, weakening a little towards evening and freshening about midnight or in the early morning. This happens especially in some of the bays from Narendry to Baie de Mahajamba, and at Baie de Sahamalaza. In Baie de Befotaka, about 35 miles south-south-westward of Cap d'Ambre, the wind comes over the island with great force about 0700, continuing all day and often most of the night. Southward of Majunga the trade wind is felt only rarely.

When the trade wind is not blowing, land and sea breezes prevail. At Nossi-Bé the land breeze is from north to north-east, and dies down at about 1000, after which the sea breeze comes up from westward, and continues until nightfall.

During November to April the north-west monsoon reaches this coast, sometimes in the form of a well-defined north-westerly sea breeze. There is hardly any land breeze, although southward of Majunga a weak land breeze blows from east to south-east. With the onset of the sea breeze the wind veers southward, south-westward, and westward, freshening to force 4 or more.

**Western coast.—Maintirano to Cap Sainte-Marie.—Winds.**—Land and sea breezes prevail in the early morning; the land breeze blows from between east and south-east, whilst the afternoon sea breeze blows from between west and south-west. Occasional northerly or north-westerly winds, known as Mozambique winds, occur when a depression moves over the island from southward of the Mozambique channel. These winds are strengthened early in the day by the onset of the sea breeze, but in the afternoon they are weakened by the same breeze which then blows from south-westward.

**Eastern coast.—Winds.**—The south-east trade is strongest from May to September, with an average force of 4; it blows as a north-easterly wind at Fort Dauphin, and as a strong easterly to south-easterly wind at Diégo-Suarez. Thus from Fort Dauphin northward along the coast the winds tend to veer from north-east to east; at about lat. 20° S. they become variable and lighter, then veer south-eastward and southward towards Diégo-Suarez, with strength. In this latter area the wind is remarkably persistent, 95 per cent. of the observations showing south-easterly winds. 5

From November to April the trade winds remain predominant in the south, in the Diégo-Suarez area lighter variable winds prevail, however, in the middle of the wet season. The predominant winds are still easterly and south-easterly, but the trade wind is interrupted by days of light westerlies. 10

**Gales.**—Apart from gales connected with tropical cyclones, gales occur as a strengthening of the south-east trade during the cool season. These have a maximum frequency of 5 per cent. of all observations in June. 15

**Land and sea breezes.**—From Diégo-Suarez to Tamatave the land breeze is westerly to south-westerly, and the sea breeze north-easterly, from November to April. From May to October the sea breeze is south-easterly. At Diégo-Suarez the wind in the morning is variable with an average force of 3, usually from a southerly or westerly direction; during the day it backs to east or south-east, increasing in strength to force 4 or 5. Between May and September the wind freshens quickly soon after sunrise, reaching an average of force 7 at 1700. Baie d'Antongil is also noted for its strong sea breeze, which although not regular, at times blows home to the head of the bay with some force, raising a rough sea. 20 25

Along the southern half of the eastern coast the land and sea breeze effect is not so well marked. Winds are easterly to north-easterly throughout the year; the land breeze is only felt as a light northerly wind, and the sea breeze as an intensification of the trade, e.g. the so-called "breeze of Fort Dauphin." 30

**Temperature.—Humidity.**—The coastal plains and the slopes of the plateau up to about 2,000 feet (609m) are warm or hot during most of the year. The hottest part of the island is the western coastal lowland. Between Maintirano and Tuléar day temperature rises from 90° to 95° in January during the hot season. On the island plains absolute maximum temperatures of 100° have been recorded. At night temperatures do not fall below about 70°. In the cool season daily maximum temperature is about 80° and the minimum about 55°. Lowest recorded temperatures are in the region of 40°. 35 40

The eastern coast is cooler at all times of year. In the hot season the average daily maximum is 78°; night temperatures fall to about 70°. In the cool season temperatures rise by day to about 75°, and fall to about 65° at night. 45

In the wet season mean relative humidity is everywhere from 75 to 85 per cent.; in regions where there is no dry season such as the eastern coast, it remains high throughout the year with a small diurnal variation of about 10 per cent. On the western and north-western coasts where there are distinct wet and dry seasons, there is a greater seasonal variation than on the eastern coast. Thus at Tuléar in July, a dry month, the mean humidity is 88 per cent. in the morning and 51 per cent. in the afternoon. In January, a wet month, the morning humidity is similar, but the afternoon reading falls only to 65 per cent. 50 55

Wet-bulb temperatures may exceed  $78^{\circ}$  in the afternoons and early evenings during the warmer weather. At Diégo-Suarez wet-bulb temperatures greater than  $78^{\circ}$  occur on about 15 days a month, at Tamatave on about 10 days, and at Fort Dauphin on one or 2 days.

5 **Cloud.**—The eastern coast is the cloudiest since it is exposed to the trade wind. The average amount of cloud is from  $\frac{3}{10}$  to  $\frac{7}{10}$ , and there is very little diurnal variation. On the western coast the average ranges from  $\frac{1}{10}$  in January to  $\frac{7}{10}$  in July. Diurnal variation is hardly noticeable.

10 **Rainfall.**—Rainfall is high on the eastern coast, varying from 80 in. to 140 in. between Antalaha and Fort Dauphin, decreasing slightly from northward to southward. Rainfall on the north-western coast is markedly less with 50 in. to 80 in., whilst the western coast has an average of only 40 in., decreasing in the south-western part to less  
15 than 20 in.

December to July are the wettest months on the eastern coast, with an average fall of from 10 to 15 in. a month. There are about 20 days a month with appreciable rain, and from 10 to 12 days with heavy rain. In August there is a sudden decrease in rainfall to about 5 in.  
20 a month, lasting until November. In the south the rainy season is shorter, ending in April.

In the north-western part of the island the rainy season lasts from November to March, during which period about 90 per cent. of the rain falls. From April to October the average amount is only from  
25 one to 2 in. a month. The western coast has an even more pronounced dry season. At Morondava, April to October is almost rainless, but during the rest of the year rain falls on about 10 days a month. Days with heavy rain occur on from about 4 to 6 days a month.

In the south-western part of the island, which is the driest part,  
30 rainfall is more evenly distributed throughout the year. At Tuléar about a quarter of the total rainfall falls in the dry season, and thunderstorms are liable to occur at almost any time of the year. Rain falls on about 5 days a month in the wet season, 3 of these being days with heavy rain, and on from 2 to 3 days in the drier season.

35 The Diégo-Suarez region is beyond the area of the eastern coast winter rains, and there is a definite dry season from May to October, when the average fall is less than 0.5 in. a month. During the wetter months, December to March, appreciable rain falls on from 10 to 16 days a month and heavy rain on from 5 to 7 days. On the western  
40 and north-western coasts and in the interior rain is most likely in the afternoon, often occurring with thunderstorms. This is also the case on the eastern coast when the trade wind is weak. Otherwise, with the trade wind blowing strongly there is probably a tendency for most rain to fall at night.

45 **Visibility.**—Fog and mist are rare. In coastal areas the main causes of poor visibility are heavy rain, also early morning fog in parts of the western lowlands. In the northern part of the island early morning haze also reduces visibility.

Occasional early morning fogs occur on the north-western coast.  
50 At Nossi-Bé there are 8 days in the year with fog; they usually disperse an hour or so after sunrise. On the western coast, at Morondava, early morning fogs are more frequent, occurring on some 55 days a year, with a maximum frequency between May and October.

On the eastern coast visibility may be reduced from one to 2 miles  
55 during rain. Fog is very rare except locally over the land; in the Farafangana area there is an average of 29 fogs a year, with from 3 to

4 fogs a month from May to September. In the Diégo-Suarez area fog is practically unknown. Haze is sometimes present during the dry season, May to September, but visibility is rarely reduced to less than 6 miles.

**Local weather.—Ile de la Réunion.—Winds.**—The south-east trade is at its greatest strength between June and August. From April to October, its direction varies between east-south-east and south-east. The wind usually freshens at about 0900, and falls at 1600. During the night it normally dies away to a calm; if this does not occur the wind generally blows very fresh the next day.

From November to March, the bad weather season, south-easterly and easterly winds still prevail, but calms are frequent. During these months small cyclonic disturbances with heavy gusts of wind may occur, followed by a calm or by a short-lived westerly or north-westerly wind. Tropical cyclones occasionally affect the island, *see* page 41.

**Temperature.—Humidity.**—The temperatures given in the climatological table refer to an elevation of over 3,000 feet (914<sup>m</sup>4), and are therefore lower than those normally experienced near the sea.

The eastern coast and the eastward-sloping hill sides have a hot moist climate, whilst on the western coast the climate is hot and dry.

Relative humidity, at sea level on the west coast, is probably some 15 to 20 per cent. lower than that shown in the climatological table. On the southern and eastern sides of the island the difference will be less.

**Cloud.**—There is little seasonal variation in cloud amount. The average cloud amount at an altitude of 3,000 feet (914<sup>m</sup>4) in the afternoon is between  $\frac{1}{10}$  and  $\frac{1}{8}$ . The afternoon maximum is less pronounced at sea level.

**Rainfall.**—Owing to the mountainous character of the island, the rainfall differs from place to place. The western side of the island is the driest. The rainy season is from November to April, with most rain between December and March. Rain is not normally continuous or heavy. The average annual fall at Saint-Benoît on the north-eastern coast is 153 in., while at Saint-Pierre on the south-western coast it is only 41 in.

The number of days with rain in a year varies from about 92 at Saint-Pierre to about 244 at Saint-Benoît.

In calm weather, or on the sheltered side of the island, rain is more likely during the day, especially in the afternoon, but in windy weather, when the south-east trade is blowing, it is more likely to rain at night.

**Local weather.—Mauritius.—Winds.**—The south-east trade wind blows almost constantly from between east and east-south-east between force 2 and 4. Between November and January the wind fairly often backs to northward of east, and about 12 per cent. of the observations show winds blowing from north-eastward.

Tropical cyclones may affect the island between December and April, but the average number of days with gale (wind of force 8 or more) is however less than one a year. *See* page 41.

On the north-eastern coast, there is a fairly regular diurnal variation in wind speed, which increases from sunrise to a maximum between 1000 and 1600; it decreases to a minimum at about 0100.

Land and sea breezes sometimes occur during periods of calm weather on the western and north-western coasts from December to February.

**Temperature.—Humidity.**—The hottest months are from December to March when at sea level the mean daily maximum and minimum temperature averages 85° and 73°, respectively. The highest recorded

temperature is 95°. The coolest months are July and August, with an average daily minimum of 62°. The lowest recorded temperature is 50°. Considerably lower temperatures are experienced at higher levels.

Relative humidity varies from place to place according to its aspect and elevation. The southern and south-eastern coasts are the most humid, and the low-lying north-western and western coasts are the driest, as the prevailing trade wind loses much of its moisture in its passage across the island.

On the north-western side of the island, the maximum humidity occurs in March, with an average of 80 per cent., and the minimum in November with 70 per cent. At sea level on the west coast the atmosphere is much drier.

The wet-bulb temperature is normally below 78° although, in the hotter months, the mean value at midday is only one or two degrees below that limit, and it may exceed it on some days.

**Cloud.**—The amount of cloud hardly varies from month to month, averaging about  $\frac{1}{10}$ .

There is more cloud in the afternoon than in the morning, but the difference is only from  $\frac{1}{10}$  to  $\frac{2}{10}$  in the cool season and from  $\frac{2}{10}$  to  $\frac{3}{10}$  in the warmer weather.

**Rainfall.**—The data given in the climatological table apply only to the north-western part, not to the whole island. The amount of rainfall increases with elevation. The southern and eastern coasts exposed to the trade wind, and where the land rises to 1800 feet (548<sup>m</sup>6) within 5 miles of the sea, have most rain with a yearly average of about 90 in. On the western coast the average is 35 in.

December to April are the rainiest months, but as the island is sometimes visited by cyclones, there is considerable variation in this respect from year to year and from one place to another. In general about 35 to 50 per cent. of the total rain falls from January to March, whilst 10 to 20 per cent. falls from June to August, mainly due to the south-east trade. The cyclonic rain is heavy; the rain brought by the trade wind is fine and long-lasting.

Heavy thunder rain also occurs during November to May, probably falling on about 5 days a month.

In calm weather, or on the sheltered side of the island, rain is more likely during the day, especially in the afternoon, but in windy weather, when the south-east trade is blowing, it is more likely to rain at night.

**Visibility.**—Fogs are rare, except in the mountainous interior of the island. Elsewhere visibility less than 2 miles may occur during heavy rain.

**Local weather.**—**Rodriguez island.**—**Winds.**—The south-east trade blows throughout the year. The direction of the wind is mainly easterly, but from May to October is from between east and south-east, with a mean speed of from 6 to 7 knots. From November to April the wind may at times back north-eastward, and remain there for some days. The island is within the area affected by tropical cyclones, see page 41.

**Temperature.**—**Humidity.**—The hottest season is from January to March when, on the average, day temperatures rise to 86°; the highest recorded temperature was 93° in March. Night temperatures do not usually fall much below 75°.

July and August are the coolest months, when the average daily maximum is 77°, and the night minimum is 66°. The lowest recorded temperature was 59° in August.

Relative humidity shows little monthly variation. The most humid

months are February to April, and the least humid September to December.

The highest wet-bulb temperatures occur in February and March, and average  $77^{\circ}$  at the morning and afternoon observations.

**Cloud.**—There is no pronounced seasonal variation in cloud amount which averages from  $\frac{5}{10}$  to  $\frac{6}{10}$  in each month. There is slightly more cloud in the afternoon than in the morning, except between August and November when the mornings are a little cloudier than the afternoons. 5

**Rainfall.**—January to May are the wettest months, the greatest amount of rain, 8 in., falling in March. Days with heavy rain probably occur on from 4 to 6 days a month. The driest month is November with an average fall of 1.1 in. Between June and December the problem of the island water supply may be serious, as many of the streams are absolutely dry towards the end of the season. 10

In calm weather, or on the sheltered side of the island, rain is more likely during the day, especially in the afternoon, but in windy weather, when the south-east trade is blowing, it is more likely to rain at night. 15

**Visibility.**—Visibility may be lowered to less than 2 miles during heavy rain. Fog or mist is reported to be rare at or near sea level.

**Local weather.**—**Ile Saint-Paul.**—**General conditions.**—West-erly winds prevail throughout the year, varying between north-north-west and south-south-west; but during December, January, and February, easterly winds are sometimes experienced. 20

Gales are frequent during the winter months, occurring on about 12 days a month, from June to September, and about 6 days a month during the rest of the year. Heavy hailstorms occur, and snow falls occasionally. 25

The average temperature is about  $60^{\circ}$  in January and  $54^{\circ}$  in July. January is the finest month.

PLACE—SEYCHELLES (MAHÉ). LAT. 4° 37' S., LONG. 55° 27' E. Height above Mean Sea Level, 15 feet (4m6).  
 Meteorological Table compiled from 2 to 30 Years' Observations, to 1936.

MONTH	PRES- SURE at M.S.L.	AIR TEMPERATURE Mean of			Cloud amount Scale 0-10	RAIN		WIND DIRECTION												No. of days with fog or mist																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		Daily max.	Daily min.	Mean of		Average fall	No. of days with 0.1 in. or more	Percentage of observations from						Percentage of observations from																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
								N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E.		SE.	S.	SW.	W.	NW.	Calm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
January	mb. 1012	83	77	80	78	76	6-0	6-2	—	131	—	6	9	22	25	7	2	4	17	8	6	17	25	10	3	6	18	9	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

† Highest recorded temperature. †† Lowest recorded temperature. ‡ Days on which visibility falls below 2 nautical miles.

Authorities :—MS. data supplied by Indian Met. Dept., Simla.  
 Calcutta, India Weather Review.  
 Calcutta, Indian Met. Memoirs, Vol. XVII.

METEOROLOGICAL OFFICE,  
 AIR MINISTRY.

PLACE—DIEGO GARCIA, CHAGOS ARCHIPELAGO. LAT. 7° 14' S., LONG. 72° 26' E. Height above Mean Sea Level, unknown.  
 Meteorological Table compiled from 1 to 4 Years' Observations, July 1907 to August 1912.

MONTH	PRES- SURE at M.S.L.  Mean †	AIR TEMPERATURE Mean of				Relative humidity ½ (9 + 15)	Cloud amount; Scale 0—1 ½ (9 + 15)	RAIN  Average fall	WIND DIRECTION										Mean wind speed in knots 24 hr. mean	No. of days with gale	No. of days with fog or mist
		Daily max.	Daily min.	Highest in each month	Lowest in each month				N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm				
																		Percentage of observations from			
0900 and 1500																					
January	mb.	° F.	° F.	° F.	° F.	%	5.3	in.	12	9	6	19	4	6	12	80	2	4	—		
February	1013	85	77	—	—	83	5.3	13.9	7	8	2	15	2	8	22	43	1	4	—		
March	1013	85	78	—	—	80	5.4	12.1	9	6	6	39	7	6	14	39	1	4	—		
April	1013	86	78	—	—	77	5.4	9.1	2	6	11	52	11	4	12	18	2	4	—		
May	1012	85	78	—	—	77	5.4	9.4	1	8	11	63	19	4	0	8	5	4	—		
June	1015	83	76	—	—	80	5.1	8.1	2	3	9	63	16	3	1	3	2	4	—		
July	1015	82	76	—	—	78	5.0	9.1	2	2	8	69	15	3	1	2	1	4	—		
August	1015	82	75	—	—	76	5.0	8.2	1	2	10	61	14	4	4	4	0	4	—		
September	1013	83	76	—	—	76	4.0	9.1	2	9	17	41	20	2	1	3	3	4	—		
October	1013	83	77	—	—	81	5.7	12.4	5	10	21	40	11	2	1	1	1	4	—		
November	1014	84	77	—	—	79	6.7	16.6	2	48	5	34	9	0	0	0	0	4	—		
December	1012	—	—	—	—	—	5.7	8.7	—	—	—	—	—	—	—	—	—	—	—		
Means	1014	—	—	—	—	—	5.3	—	4	10	9	42	11	4	6	12	2	4	—		
Totals	—	—	—	—	—	—	—	102.1	—	—	—	—	—	—	—	—	—	—	—		
Extreme values	—	—	—	88†	71††	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
No. of years' observations	—	1-2				1-2	1-4	1-4	1-4										1-3	—	—

† Highest recorded temperature.

†† Lowest recorded temperature.

‡ Interpolated from charts.

Authorities :—Calcutta, India Weather Review.  
 METEOROLOGICAL OFFICE,  
 AIR MINISTRY.



PLACE—Nossi-Bé. LAT. 13° 24' S., LONG. 48° 17' E. Height above Mean Sea Level, 60 feet (18m<sup>3</sup>).  
 Meteorological Table compiled from 1 to 31 Years' Observations.

MONTH	PRES- SURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity	Cloud amount Scale 0-10 ‡	RAIN		WIND DIRECTION												No. of days with fog or mist	No. of days with gale																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		Daily max.	Daily min.	Mean of				Average fall	No. of days with 0.04 in. or more	Percentage of observations from						Percentage of observations from																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
				Highest in each month	Lowest in each month					0700			1300			1700			0700					1300			1700																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
										N. NE.	E. SE.	S.	SW.	W.	NW.	Calm	N.	NE.	E. SE.	S.	SW.			W.	NW.	Calm	N. NE.	E. SE.	S.	SW.	W.	NW.	Calm																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
January	mb. 1011	° F. 8	° F. 76	° F. 86	72	5	20	in.	4	3	6	7	6	1	67	3	2	1	0	13	46	23	9	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Time—45th Meridian East.

† Highest recorded temperature. ‡ 6 years.  
 †† Lowest recorded temperature. ‡ Low cloud only.

\* Mean of highest each year.

\*\* Mean of lowest each year.

Authorities :—Service Météorologique de Madagascar.

METEOROLOGICAL OFFICE,  
 AIR MINISTRY.

PLACE—TULÉAR. LAT. 23° 20' S., LONG. 43° 41' E. Height above Mean Sea Level, 20 feet (6m).  
 Meteorological Table compiled from 5 to 38 Years' Observations.

MONTH	PRES- SURE at M.S.L.  Mean 0700	AIR TEMPERATURE Mean of		Relative humidity	Cloud amount Scale 0-10 ‡	RAIN  Average fall No. of days with 0.4 in. or more	WIND DIRECTION												Mean wind speed in knots	No. of days with gale	No. of days with fog or mist										
		Daily mx.	Daily mn.				Highest in each month		Lowest in each month		Percentage of observations from						Percentage of observations from														
											0700						1700														
											Percentage of observations from						Percentage of observations from														
											N.	NE.	E.	SE.	S.	SW.	W.	NW.				Calm	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm
											0700	1800	0700	1800	0700	1800	0700	1800				0700	1800	0700	1800	0700	1800	0700	1800	0700	1800
January	mb.	° F.	° F.	%	%	in.	16	10	12	13	9	7	2	1	35	5	6	21	37	21	4	5	24	37	32	12	12	0			
February	1010	91	71	93	65	3.6	9	15	14	14	23	14	7	2	37	39	6	10	45	19	4	5	23	45	11	12	0				
March	1011	89	69	94	62	1.6	11	8	14	19	10	8	7	2	42	39	3	21	40	21	4	5	27	40	11	12	0				
April	1014	87	65	94	54	1.2	2	4	11	16	13	8	4	2	40	34	4	17	33	17	4	5	33	37	11	12	0				
May	1017	84	59	91	52	0.6	1	5	11	19	10	8	4	2	39	34	3	24	33	17	3	4	34	37	11	12	0				
June	1019	81	56	87	49	0.4	5	7	17	24	15	11	5	2	34	31	2	30	37	21	2	4	33	37	11	12	0				
July	1021	80	58	85	46	0.2	1	9	17	20	19	8	4	1	30	26	3	14	34	17	2	3	34	37	11	12	0				
August	1020	81	56	89	52	0.4	5	7	20	19	18	11	5	2	34	31	2	14	34	17	2	3	34	37	11	12	0				
September	1018	83	59	92	51	0.5	11	9	14	16	14	10	7	3	22	23	3	16	44	16	2	2	31	47	18	13	1				
October	1016	85	62	92	55	0.8	10	8	12	15	13	13	5	3	23	22	3	13	47	18	2	2	31	47	18	13	1				
November	1013	87	67	94	59	0.2	14	15	16	18	12	12	2	3	33	23	2	19	35	19	2	3	38	35	17	13	0				
December	1012	89	70	94	63	2.4	10	15	13	11	11	9	2	4	33	23	0	21	46	21	3	3	26	46	7	13	0				
Means	1015	86	63	92*	56**	16.6	9	9	15	16	0	4	3	2	33	3	2	18	40	18	3	4	30	40	6	12	—	3			
Totals	—	—	—	—	—	38	9	5	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	—			
Extreme values	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
No. of years' observations	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			

Time—45th Meridian East.

\* Mean of highest each year.  
 \*\* Mean of lowest each year.

§ Definition not known.  
 ‡ Low cloud only.

Authorities :—Service Météorologique de Madagascar.

METEOROLOGICAL OFFICE,  
 AIR MINISTRY.

PLACE—TAMATAVE. LAT. 18° 07' S., LONG. 49° 24' E. Height above Mean Sea Level, 20 feet (6m1).  
 Meteorological Table compiled from 6 to 38 Years' Observations.

MONTH	PRES- SURE at M.S.L.	AIR TEMPERATURE Mean of				Relative humidity	Cloud amount Scale 0-10 ‡	RAIN  Average fall No. of days with 0.04 in. or more	WIND DIRECTION												Mean wind speed in knots	No. of days With gale or mist	No. of days With fog or mist																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		Daily max.	Daily min.	Highest in each month					Lowest in each month		Percentage of observations from						Percentage of observations from																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
				° F.	° F.				° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.				° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F

Time—45th Meridian East.

† Highest recorded temperature. ‡ 6 years.  
 †† Lowest recorded temperature. ‡ Low cloud only.

\* Mean of highest year.  
 \*\* Mean of lowest each year

Authorities :—Service Météorologique de Madagascar.

METEOROLOGICAL OFFICE,  
 AIR MINISTRY.

PLACE—FARAFANGANA. LAT. 22° 49' S., LONG. 47° 47' E. Height above Mean Sea Level, 10 feet (3m).  
 Meteorological Table compiled from 2 to 32 Years' Observations, to 1939.

MONTH	PRES- SURE at M.S.L. Mean	AIR TEMPERATURE Mean of		Relative humidity	Cloud amount Scale 0-10	RAIN		WIND DIRECTION												No. of days with fog or mist	No. of days with gale								
		Daily max.	Daily min.			Highest in each month	Lowest in each month	Average fall	No. of days with 0.04 in. or more	Percentage of observations from						Percentage of observations from													
										0700						1700						Mean wind speed in knots							
										N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.			NE.	E.	SE.	S.	SW.	W.	NW.	Calm
January	mb. 1011	86	78	89	89	5.8	12.8	11	7	21	6	2	5	24	5	20	6	34	29	22	5	8	0	0	5	1	13		
February	1011	87	74	92	89	6.7	10.8	16	5	2	5	10	8	11	12	12	38	37	36	14	5	4	0	2	2	3	9		
March	1012	86	72	90	87	6.7	14.1	16	5	2	5	10	8	12	16	17	27	29	21	39	2	5	2	0	3	11	9		
April	1016	83	69	88	82	6.7	11.1	14	2	8	2	3	8	12	18	15	37	25	25	20	10	10	2	0	3	11	9		
May	1018	81	66	85	80	6.0	8.9	12	2	8	2	3	8	8	22	23	35	0	34	11	21	6	15	0	0	13	1		
June	1022	77	62	83	75	6.0	7.3	12	2	8	2	3	8	15	22	29	20	17	23	7	13	17	3	5	1	10	9		
July	1023	76	61	80	73	6.0	5.7	12	2	8	2	2	8	6	16	40	31	5	54	13	5	8	0	0	10	2	9		
August	1022	77	62	83	75	6.0	5.0	17	3	6	2	2	8	8	10	18	51	2	45	29	14	5	3	2	0	1	9		
September	1021	78	63	82	75	6.0	4.3	10	17	29	26	0	0	8	5	10	39	0	43	32	8	7	5	3	0	2	10		
October	1018	81	66	83	75	5.0	3.5	9	18	36	8	3	0	7	2	5	22	0	61	32	2	3	2	0	0	5	12		
November	1015	82	69	86	83	6.7	10.4	15	10	16	8	3	0	15	8	8	32	0	43	37	8	10	2	0	0	5	12		
December	1013	84	72	90	86	6.0	10.4	15	10	16	8	3	0	15	8	8	32	0	31	35	13	15	6	0	0	2	16		
Means	1017	81	67	96*	89**	6.0	4.9	9	12	4	3	1	11	12	17	31	1	38	27	14	7	7	1	1	4	2	11		
Totals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Extreme values	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
No. of years	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
observations	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

Time—45th Meridian East.  
 † Highest recorded temperature.  
 ‡ Lowest recorded temperature.

\* Mean of highest each year.  
 \*\* Mean of lowest each year.

Authorities :—Service Météorologique de Madagascar.

METEOROLOGICAL OFFICE,  
 AIR MINISTRY.

PLACE-REUNION (HELLBOURG). LAT. 21° 04' S., LONG. 55° 22' E. Height above Mean Sea Level, 3,070 feet (935m<sup>7</sup>).  
 Meteorological Table compiled from 5 to 11 Years' Observations, 1897 to 1910.

MONTH	PRES- SURE at M.S.L.	AIR TEMPERATURE Mean of					Relative humidity		Cloud amount Scale 0-10		RAIN		WIND DIRECTION										No. of days with gale	No. of days with fog or mist
		Daily max.	Daily min.	each month		Lowest in each month.	0700	1800	Average fall	No. of days with trace or more	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm					
† 24 hr. Mean	mb.	° F.	° F.	° F.	° F.	%	%	4-1	8-0	in.	16	0	1	3	32	41	10	4	3	4	—	—		
January	1013	74	59	70	54	93	89	3.6	6.8	22.4	15	0	1	3	24	47	5	2	6	10	—	—		
February	1013	75	60	80	55	94	91	4.8	7.4	16.4	18	0	0	3	25	42	12	3	7	6	—	—		
March	1014	73	56	78	50	92	89	3.8	7.1	7.2	13	0	0	1	24	43	12	1	4	12	—	—		
April	1017	69	52	75	46	89	89	3.4	7.1	5.3	11	0	0	3	23	47	14	3	3	3	—	—		
May	1019	67	50	72	44	91	90	4.0	7.8	4.4	9	0	0	3	24	50	11	4	4	3	—	—		
June	1021	65	48	70	43	92	86	3.8	7.5	3.1	13	1	1	1	23	54	11	4	0	3	—	—		
July	1021	86	47	71	42	88	86	3.1	7.2	3.0	11	2	2	1	17	61	9	3	2	3	—	—		
August	1021	66	48	71	44	89	87	3.6	7.7	2.0	10	1	1	1	31	53	9	1	1	1	—	—		
September	1018	69	51	75	46	89	87	3.9	7.5	2.3	10	1	3	3	36	36	7	1	5	5	—	—		
October	1016	71	53	76	49	91	90	3.5	8.1	3.5	10	4	5	6	27	41	9	1	8	4	—	—		
November	1016	71	53	76	49	91	90	3.5	8.1	3.5	10	4	5	6	27	41	9	1	8	4	—	—		
December	1014	73	57	79	52	92	90	5.0	8.0	12.9	15	3	2	2	40	10	10	3	5	9	—	—		
Means	1017	70	53	82°	41**	91	89	3.9	7.5	—	—	1	2	26	46	10	3	3	4	5	—	—		
Totals	—	—	—	—	—	—	—	—	—	90.5	151	—	—	—	—	—	—	—	—	—	—	—		
Extreme values	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
No. of years' observa- tions	6	5					11					6										—		

\* Mean of highest each year.

\*\* Mean of lowest each year.

† Highest recorded temperature.

†† Lowest recorded temperature.

‡ From obs. at St. Denis, 20° 51' S., 55° 30' E., 102 ft.

Authorities:—Paris, Ann. Bur. Centr. Meteor., Pt. II.

METEOROLOGICAL OFFICE,  
AIR MINISTRY.



PLACE—RODRIGUEZ. LAT. 19° 41' S., LONG. 63° 27' E. Height above Mean Sea Level, 140 feet (42m7).  
 Meteorological Table compiled from 5 to 10 Years' Observations, 1929 to 1938.

MONTH	PRES- SURE at M.S.L.  Mean †	AIR TEMPERATURE Mean of			Relative humidity		Cloud amount Scale 0—10	RAIN		WIND DIRECTION										No. of days with fog or mist									
		Daily max.	Daily min.	Highest in each month	Lowest in each month	Average fall		No. of days with 0.004 in. or more	Percentage of observations from					Percentage of observations from															
									0900					1500					Mean wind speed in knots 24 hr. mean					No. of days with gale					
									Percentage of observations from					Percentage of observations from															
									N	NE.	E.	SE.	S.	SW.	W.	NW.	Calm	N.	NE.		E.	SE.	S.		SW.	W.	NW.	Calm	
January	mb. 1012	° F. 86	° F. 75	° F. 83	° F. 73	5.8	in. 18	18	1	13	53	19	2	1	1	3	2	2	17	52	19	4	0	2	2	1	0	0.2	7
February	1011	86	75	83	72	6.0	5.5	19	0	13	44	22	5	2	0	7	3	14	42	22	22	4	2	3	2	1	0	0.4	6
March	1012	86	75	89	73	5.8	8.3	20	0	7	52	22	4	3	0	10	5	15	54	21	23	9	3	3	0	0	0	0.2	5
April	1014	84	74	87	71	6.0	6.1	19	1	12	47	21	9	4	0	5	5	12	44	23	28	9	3	3	0	0	0	0.1	6
May	1017	81	71	85	67	5.7	5.1	20	1	6	46	33	6	2	4	7	4	15	43	37	37	7	2	1	0	0	0	0	6
June	1019	79	68	82	64	5.8	3.0	21	0	5	43	39	9	0	0	5	3	4	45	40	39	8	2	0	0	0	0	0	6
July	1020	77	67	80	64	5.9	3.4	23	0	5	43	47	18	3	0	2	0	7	45	31	45	12	4	0	0	0	0	0	6
August	1021	77	66	80	63	6.0	4.0	22	0	5	40	49	19	1	0	1	0	11	51	31	44	5	1	0	0	0	0	0	6
September	1020	78	67	81	63	5.7	1.9	18	1	12	55	28	9	1	0	1	0	15	61	20	31	0	0	0	0	0	0	0	6
October	1018	80	68	83	65	5.5	1.2	16	0	12	55	28	3	1	0	1	0	21	55	14	20	0	0	0	0	0	0	0	6
November	1017	82	71	85	68	5.5	1.3	13	1	17	64	17	0	0	0	1	1	21	61	20	31	0	0	0	0	0	0	0	6
December	1014	85	73	88	70	5.3	2.5	15	1	25	56	12	1	0	1	3	1	21	55	14	20	0	0	0	0	0	0	0	6
Means . . .	1016	82	71	90*	62**	5.8	2.5	15	1	11	47	28	6	2	0	1	4	1	10	47	29	7	1	1	1	1	1	1	10
Totals . . .	—	—	—	—	—	—	52.†	222	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
Extreme values	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
No. of years' observations	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

\* Mean of highest each year.  
 \*\* Mean of lowest each year.  
 † Highest recorded temperature.  
 ‡ Lowest recorded temperature.  
 § Standard of time—Zone—4.  
 ¶ (0900 + 1500).  
 †† Beaufort force 8 or more.

Authorities :—MS. data supplied by the Royal Alfred Observatory, Mauritius.

METEOROLOGICAL OFFICE,  
 AIR MINISTRY.

## CHAPTER II

## SEYCHELLES AND AMIRANTE GROUPS—ALPHONSE AND COETIVY ISLANDS

*Chart 721.*

**SEYCHELLES GROUP.—General remarks.**—A coral bank, on which lie many islands, islets, and rocks, extends about 200 miles east-south-eastward and west-north-westward, between the parallels of 3° 40' S. and 6° 05' S., and between the meridians of 53° 56' E. and 57° 10' E. 5

The principal islands are Mahé, Praslin, Silhouette, and La Digue; the islands of this group are mostly covered with trees. In 1940, the population was estimated at 32,150.

There is regular communication by Government launch between 10 Mahé, Praslin, and La Digue islands.

**Depths.—Directions.**—There are moderate depths over the bank on which lies the Seychelles group, with occasional patches of much shoaler water, especially at its eastern and western parts. The northern edge is marked by Bird and Denis islands, and an examination by 15 H.M.S. *Stork*, in 1892, shows that a nearly continuous rim of more or less shallow water extends from Bird island to the western extremity of the bank, and thence for a considerable distance round its southern side. As many dangerous shoals may exist on this rim besides those already known, vessels are advised to avoid crossing the edge of the 20 bank northward of the parallel of 5° S., except by the route described below. Southward of this parallel, according to present information, there would appear to be a break in the rim.

From northward a vessel should pass between Bird and Denis islands, within 10 miles of the latter, and thence steer towards Mamelie islet, 25 21 miles southward of Denis island.

From southward a vessel should steer to pass through a position lat. 5° 07' S., long. 55° 18' E., and thence 5 miles eastward of Capucin point, the south-eastern extremity of Mahé island.

The position of the various shoaler parts of the main body of this 30 bank can best be seen on the chart. Vessels navigating in this locality should exercise great caution and vigilance, and sound continuously.

**Currents.**—For ocean currents in the neighbourhood of the Seychelles, see pages 13, 14, and 15.

The direction of the currents over the Seychelles bank and amongst 35 the islands varies with the winds, especially between Mahé (Lat. 4° 39' S., Long. 55° 26' E.) and Praslin islands; thus, during the whole of June and until the end of September it sets a little northward or southward of west at a rate of from 24 to 30 miles a day. In October,

*Charts 2899, 748b.*



*Chart 721.*

November, and part of December, it is variable. From the middle of December to the middle of April it sets eastward; at the end of April and during May it is again variable.

- 5 The currents appear to set round the bank, generally setting eastward along the northern and westward along the southern side; northward of the bank they are very irregular. The rate of these streams appears to depend on the force of the south-easterly wind in the southern hemisphere, and is often as much as 2 knots northward of  
10 the islands. After a period of west-south-westerly wind, the current becomes variable in direction and rate. On the southern side of the bank it sets westward more regularly at a rate of about one knot. Sometimes, but rarely, it sets northward or southward.

**Local weather.**—See page 45.

- 15 **Outlying shoals and banks.**—In 1920, a 9-fathom ( $16^m5$ ) patch, with probably less depths in the vicinity, were reported to lie about 5 miles west-south-westward of Bird island.

Andromache and Vigilant shoals were discovered by H.M. ships of those names in 1835 and 1865, respectively, and are evidently part of  
20 a ridge lying close to the edge of the bank; the least depth found over the former shoal was 5 fathoms ( $9^m1$ ), lying about 24 miles west-south-westward of Bird island, and a least depth of 6 fathoms ( $11^m0$ ) over the latter shoal, lying about 8 miles further west-south-westward. Depths of from 6 to 7 fathoms ( $11^m0$  to  $12^m8$ ) lie within about from  
25 4 to 8 miles east-north-eastward of Andromache shoal.

Swan shoal, about 41 miles west-south-westward of Bird island, with depths of 3 fathoms ( $5^m5$ ) over it, was reported by the whaler *Swan*, which twice passed over it, in 1825, but, in 1924, less depths were reported over this shoal.

- 30 Dupont shoal, with a depth of  $3\frac{1}{2}$  fathoms ( $6^m4$ ) over it, lies 57 miles south-westward of Bird island, and between this shoal and Swan shoal lies a bank, with a least depth of 7 fathoms ( $12^m8$ ); along the edge of the Seychelles bank, in this vicinity, extending for a distance of about 12 miles, is a ridge with depths of from 7 to 10 fathoms  
35 ( $12^m8$  to  $18^m3$ ), the outer edge of which is steep-to.

A 9-fathom ( $16^m5$ ) patch, lying about 55 miles westward of Silhouette island, was reported, in 1890, by H.M.S. *Conquest*; about 7 miles south-westward of this patch is a 7-fathom ( $12^m8$ ) patch, with a 10-fathom ( $18^m3$ ) patch about 3 miles further northward.

- 40 A 7-fathom ( $12^m8$ ) patch and a 9-fathom ( $16^m5$ ) patch were reported, in 1942, about 14 miles south-westward and 10 miles south-south-westward, respectively, of the charted position of *Conquest* patch, and the depths in this vicinity are irregular.

Seagull shoal, with a least depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ) over it, lies  
45 about 62 miles west-south-westward of Silhouette island (*Lat.*  $4^\circ 29' S.$ , *Long.*  $55^\circ 14' E.$ ); in 1924, less depths were reported over this shoal.

In 1905, the *Sherard Osborn* found a 10-fathom ( $18^m3$ ) rocky patch, near the edge of the bank, about 46 miles west-south-westward of  
50 Silhouette island; the depths between this patch and Seagull shoal are irregular.

An 8-fathom ( $14^m6$ ) patch, which was reported, in 1936, lies 35 miles south-westward of Silhouette island.

In 1911, H.M.S. *Hermes* found a 9-fathom ( $16^m5$ ) patch about 31 miles

*Charts 2899, 748b.*

*Chart 721.*

south-westward of the western extremity of Mahé island, but there are probably less depths in this vicinity.

Banks, with least depths of 12 and 13 fathoms (21<sup>m</sup>9 and 23<sup>m</sup>8) over them, reported in 1942 and 1941, respectively, lie about 21 miles south-south-westward and 27 miles southward of Mahé island; the positions of these banks are approximate; a bank, with a depth of 15 fathoms (27<sup>m</sup>4), the position of which is doubtful, lies about 30 miles south-south-eastward of the same island.

A shoal, with a least depth of 6 fathoms (11<sup>m</sup>0) over it, the position of which is doubtful, was reported, in 1873, by the French schooner *Gilberte*, to lie about 22 miles south-south-eastward of Mahé island.

In 1864, the French frigate *La Junon* found depths of from 11 to 17 fathoms (20<sup>m</sup>1 to 31<sup>m</sup>1) on the meridian of 57° 05' E., between the parallels of 5° 05' S., and 5° 11' S. Another vessel having found depths of from 11 to 13 fathoms (20<sup>m</sup>1 to 23<sup>m</sup>8) on the same meridian between the parallels of 5° 10' S., and 5° 20' S., this is considered part of the same bank, which is charted as extending from lat. 5° 06' S., to lat. 5° 18' S., its eastern side must lie near the edge of soundings.

Zoroaster shoal, lying about 62 miles south-eastward of La Digue, with a depth of 7 fathoms (12<sup>m</sup>8) over it, was passed over by a brig of that name, prior to the year 1886; it was considered from appearances that there were less depths over some patches. There are several 9-fathom (16<sup>m</sup>5) patches lying within a distance of about 15 miles east-south-eastward and south-south-westward and 6 miles northward of this shoal.

Topaze bank, with a least depth of 7 fathoms (12<sup>m</sup>8) over it, lies with its western extremity about 18 miles south-eastward of La Digue and extends about 20 miles east-south-eastward; this bank was examined, in 1820, by H.M.S. *Topaze*.

Several banks, with depths of from 10 to 17 fathoms (18<sup>m</sup>3 to 32<sup>m</sup>9) over them, lie within about 13 miles northward of Topaze bank.

A bank, with a least depth of 7 fathoms (12<sup>m</sup>8) over it, the northern extremity of which is situated about 7 miles east-north-eastward of Denis island, extends about 3 miles south-south-westward; in 1941, a shoal, with a depth of less than 5 fathoms (9<sup>m</sup>1) over it, was reported to lie close eastward of the northern part of this bank, and a bank, with a depth of 9 fathoms (16<sup>m</sup>5), which was unexamined, to lie about 2 miles farther south-eastward.

*Chart 724, plan of Bird island.*

**NORTHERN ISLANDS OF GROUP.—Dangers.**—Bird island (Lat. 3° 43' S., Long. 55° 12' E.), the northernmost island of the Seychelles group, is flat, about 8 feet (2<sup>m</sup>4) high, and consists of dead coral overlaid with sand. Thick scrub borders the coast except at the northern extremity where a sandy spit extends about three-quarters of a cable. The eastern and southern sides are bordered by coral reefs, which dry, extending about 2 cables offshore. The island stands on a shoal bank extending 1½ miles west-north-westward of it, and half a mile in other directions. In 1891, Bird island was covered with coconut palms, and in the centre stood a conspicuous clump of trees, 58 feet (17<sup>m</sup>7) high; close to the coast in the middle of the western side

*Charts 721, 2899, 748b.*

D

*Chart 724, plan of Bird island.*

stood a single conspicuous casuarina tree, 54 feet (16<sup>m</sup>5) high, near which were a few fishermen's huts.

Landing may be effected on the western side of Bird island ; through the reef at its north-eastern end, or through a break in the reef on its southern side.

*Charts 724, plan of Bird island ; 721.*

An extensive bank of sand and coral, covered with patches of weed, extends about 4 miles westward of Bird island.

*10 Chart 721.*

A shoal, with a depth of 5 fathoms (9<sup>m</sup>1) over it, lies about 3 miles southward of Bird island and at the northern end of a bank, with depths of 8 fathoms (14<sup>m</sup>6), which extends 2 miles southward ; a 9-fathom (16<sup>m</sup>5) patch lies about 4 miles south-south-westward of the

*15 same island.**Charts 724, plan of Denis island ; 721.*

Denis island, lying about 27 miles eastward of Bird island, is low and flat ; in 1892, it was cultivated, covered with trees, and inhabited. The eastern and southern sides of this island are fringed by a coral reef, which dries in patches, and extends as far as 2 cables offshore ; a shallow bank, with coral heads, extends about 6 cables southward and 2 miles northward of the island.

*Chart 724, plan of Denis island.*

Landing can be effected, according to the season, near the boat-houses, either close westward of the light-tower at the northern end of the island, or close southward of the western extremity of the island.

**Light.**—A light is exhibited, at an elevation of 85 feet (25<sup>m</sup>9), from a grey iron tower, situated at the northern end of Denis island.

*Chart 724, plan of Bird island.*

**30 Anchorages.**—**Directions.**—Anchorage may be obtained in depths of from 4½ to 6 fathoms (8<sup>m</sup>2 to 11<sup>m</sup>0) at a distance of from one to 1½ miles from the western side of Bird island ; this anchorage should be approached with the single conspicuous casuarina tree on the western side of the island in line with the central clump of trees, bearing about 076°.

*35 Chart 724, plan of Denis island.*

There is anchorage in depths of about 7 fathom (12<sup>m</sup>8), sand and coral, with Denis island light-tower (Lat. 3° 48' S., Long. 55° 40' E.), bearing 233°, distant 7 cables.

*40 Charts 1072, 721.*

**CENTRAL ISLANDS OF GROUP.**—**Praslin island.**—**Dangers.**—Praslin island, lying 29 miles southward of Denis island, has a range of hills extending the whole length of the island. The highest part, near the centre, attains an elevation of 1,261 feet (384<sup>m</sup>3) ; the lower parts of this range are covered with trees. The south-western, southern, and north-eastern sides of this island are fringed by reefs which extend as far as 1½ miles offshore ; Round islet, 248 feet (75<sup>m</sup>6) high, lies on a reef which almost closes the entrance to St. Ann's bay at the south-eastern end of Praslin island.

*50 Chart 1072.*

Aride island, 443 feet (135<sup>m</sup>0) high, lying 4½ miles northward of Miller's point, the north-western extremity of Praslin island, is hilly, and is fringed by a reef on its southern side ; a bank, with a depth of

*Charts 721, 2899, 748b.*

*Chart 1072.*

14 fathoms (25<sup>m</sup>6) over it, the position of which is approximate, lies about 5 miles north-eastward of Aride island, and banks, with depths of from 19 to 20 fathoms (34<sup>m</sup>7 to 36<sup>m</sup>6), lie within 9½ miles westward of this island.

Booby islet, 2 miles north-north-westward of Millers point, is a small barren rock, 92 feet (28<sup>m</sup>0) high.

Adriens shoal, with a depth of 3½ fathoms (6<sup>m</sup>4) over it, was reported, in 1873, by H.M.S. *Vulture*, to lie, with Aride and Booby islands in line, and midway between Booby islet and Millers point; its position has not been accurately determined.

A small rock, 3 feet (0<sup>m</sup>9) high, lies about 1½ cables northward of Millers point, and shoal depths were reported, in 1942, northward of this rock; vessels should navigate with extreme caution in this vicinity. Whale rocks, lying about 1½ miles westward of Millers point, have two separate heads, which dry 3 feet (0<sup>m</sup>9).

The chain of islets and dangers extending south-westward from a position 1½ miles south-south-westward of the western extremity of Praslin island is described on page 69.

Alligator and Shark rocks, above water, lie about 2½ and 3½ miles southward of the south-western entrance point of St. Ann's bay; a shoal, with a depth of 4 fathoms (7<sup>m</sup>3) over it, lies about one mile westward of Alligator rock. The southern extremity of La Digue island in line with the southern extremity of Mary Anne island, about 5½ miles east-north-eastward, bearing 068°, leads 3½ cables southward of Shark rock.

Les Roches Canales, a reef lying in mid-channel between Praslin and La Digue islands and 6½ cables eastward of Round islet, dries 4 feet (1<sup>m</sup>2), but when covered is difficult to distinguish; it is steep-to. The southern extremity of Félicité island, 2½ miles eastward of the northern extremity of La Digue island, bearing 096° and open northward of the northern extremity of La Digue island, leads northward of this reef.

Ave Maria rock (*Lat.* 4° 19' S., *Long.* 55° 49' E.), 57 feet (17<sup>m</sup>4) high, fringed by a reef, lies in the northern entrance to the channel between Praslin and La Digue islands, about 1½ miles east-north-eastward of the eastern extremity of Praslin island.

**Caution.**—Owing to the imperfect nature of the survey chart 1072 should be used with caution.

**Anchorage.**—There is no safe anchorage on the southern side of Praslin island between the months of May and November.

In December, 1870, H.M.S. *Teazer* found good anchorage in the first small bay south-eastward of Grande Anse, a bay on the south-western side of the island.

La Blague bay, at the south-eastern end of the north-eastern side of the island, is deep, and may be approached with safety.

*Chart 1072, plan of Curieuse bay.*

**Curieuse island.**—Curieuse island, a small granite island, about 587 feet (178<sup>m</sup>9) high, lying about half a mile from the north-eastern side of Praslin island, from which it is separated by Curieuse bay, has a ridge of hills extending along its whole length, which is mostly covered with trees and scrub; in places on the southern and eastern sides of the island, where the coast is not so precipitous as on its northern and western sides, coconut palms have been planted.

*Charts 721, 2899, 748b.*

*Chart 1072, plan of Curieuse bay.*

**Curieuse bay.**—*Caution.*—Owing to irregularities in the bottom, the bay cannot be considered sufficiently sounded; the plan should, therefore, be used with caution.

- 5 **Dangers.**—The south-western side of Curieuse island is foul, and depths of less than 4 fathoms (7<sup>m</sup>3) extend as much as 2 cables offshore; the north-eastern side of Praslin island is fringed by a reef.

A rock, with a depth of 2 feet (0<sup>m</sup>6) over it, the position of which is approximate, lies on the foul ground extending south-westward of  
10 Curieuse island, about 4½ cables westward of its southern extremity; a shoal, with a depth of 18 feet (5<sup>m</sup>5), lies close south-westward of this rock.

A shoal, with a least depth of 24 feet (7<sup>m</sup>3) over it, lies about 4½ cables, and two other shoals, lie close together, with depths of 16 and 15 feet  
15 (4<sup>m</sup>9 and 4<sup>m</sup>6), about 9 cables south-westward of the southern extremity of Curieuse island; the last two shoals lie within 2½ cables of the north-eastern side of Praslin island.

A shoal, the position of which is approximate, was reported by H.M.S. *Enterprise*, in 1931, to lie about 3 cables north-westward of  
20 Zanguilles point, the south-eastern entrance point of Curieuse bay. St. Pierre islet lies about 7½ cables eastward of the northern extremity of Zanguilles point, and foul ground extends about 1½ cables north-westward of this islet; Chauve Souris islet lies about 4½ cables south-south-westward of St. Pierre islet, and a rock, nearly awash, lies  
25 midway between them. There is a boat passage through the reef westward of Chauve Souris islet leading to a good landing place.

A shoal, with a least depth of 29 feet (8<sup>m</sup>8) over it, lies about 5 cables, and a shoal, with a depth of 21 feet (6<sup>m</sup>4), 6 cables, south-south-westward of Rouge point (*Lat.* 4° 16' S., *Long.* 55° 45' E.), the eastern  
30 extremity of Curieuse island; the position of the latter shoal is approximate.

**Anchorage.**—**Directions.**—In 1931, H.M.S. *Enterprise* anchored off Anse Possession, on the southern side of Curieuse bay, in depths of 14 fathoms (25<sup>m</sup>6), with St. Pierre islet, bearing 088°, distant  
35 13 cables; this is the most sheltered part of the bay during the south-east monsoon.

There is a safe navigable channel, about 4 cables wide, between Praslin and Curieuse islands, for vessels of moderate draught.

In 1931, H.M.S. *Enterprise* recommended that all but vessels of  
40 moderate or light draught should enter Curieuse bay from eastward, and not by the western entrance.

*Chart 1072.*

**La Digue island.**—**Shoal.**—La Digue island, with its northern extremity lying about 2½ miles eastward of the eastern extremity of  
45 Praslin island, is 1,071 feet (326<sup>m</sup>4) high; its western side is fringed by a reef extending as much as 3½ cables offshore, but its eastern side is apparently free from dangers.

A rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, the position of which is approximate, lies about 1½ miles north-eastward of the  
50 southern extremity of the island and about a quarter of a mile off its south-eastern side; vessels navigating southward and south-eastward of the island should not approach within a depth of 20 fathoms (36<sup>m</sup>6).

**Félicité island.**—**Anchorage.**—Félicité island, lying about 1½ miles north-eastward of La Digue island, is 747 feet (227<sup>m</sup>7) high, and is  
55 steep-to.

*Charts 1072, 721, 2899, 748b.*

*Chart 1072.*

Albatross rocks, above water and sunken, lie about  $1\frac{1}{2}$  cables north-north-westward of Félicité island, and a rock, above water, lies about 3 cables eastward of its south-eastern extremity.

West Sister and East Sister, two rocky islets, 347 and 371 feet (105<sup>m</sup>8 and 113<sup>m</sup>1) high, respectively, separated by a deep channel, lie about  $1\frac{1}{2}$  miles northward of Félicité island; a shoal, with a depth of 7 feet (2<sup>m</sup>1) over it, the position of which is doubtful, was reported, in 1834, to lie about one mile north-westward of West Sister. A 6-fathom (11<sup>m</sup>0) patch lies in the northern approach to the channel between these two islets, about  $3\frac{1}{2}$  cables north-eastward of the north-western extremity of West Sister, and a rock, above water, lies about 5 cables southward of East Sister.

Mary Anne island, 425 feet (129<sup>m</sup>5) high, lying about 2 miles eastward of the south-eastern extremity of Félicité island, is steep-to, except on its western side.

Small vessels with local knowledge can obtain anchorage between Albatross rocks and Félicité island in depths of 9 fathoms (16<sup>m</sup>5).

**Islets and dangers south-westward of Praslin island.—Light.** —North Cousin, an islet, 216 feet (65<sup>m</sup>8) high, lying about  $2\frac{1}{2}$  miles south-south-westward of Millers point and  $1\frac{1}{4}$  miles from the south-western side of Praslin island, has a rocky spit extending about 2 cables west-south-westward from its western extremity; about  $1\frac{1}{4}$  miles north-westward of North Cousin lies a rocky coral patch, awash, and about  $3\frac{1}{2}$  cables west-north-westward of the same islet lies a coral patch, with a least depth of  $2\frac{1}{2}$  fathoms (4<sup>m</sup>6) over it.

South Cousin (*Lat.* 4° 21' S., *Long.* 55° 39' E.), an islet, 252 feet (76<sup>m</sup>8) high, lying about  $1\frac{1}{4}$  miles south-westward of North Cousin, is fringed on its northern side by a reef; the channel between South Cousin and Trompeuse rocks, about  $2\frac{1}{4}$  miles south-westward of South Cousin, is reported to be foul.

Trompeuse rocks, a group of rocks, 6 feet (1<sup>m</sup>8) high, have often been mistaken for Madge or Blanchisseuse rocks, lying about  $2\frac{1}{4}$  miles west-south-westward.

Madge rocks, which dry, are two in number, and lie about  $3\frac{1}{2}$  cables apart; the summit of St. Anne island, about  $12\frac{1}{2}$  miles south-south-westward, bearing less than 195° and well open westward of Mamelles islet, 5 miles south-south-westward of Madge rocks, leads westward of these rocks.

Mamelles islet is a small rocky islet consisting of two distinct summits with a low dip between them; the southern and higher summit is 140 feet (42<sup>m</sup>7) high. The islet appears white and is the breeding place of many birds. There is a fairly good landing place, during moderate weather, in the small bay on its north-western side. A group of sunken rocks, over which the sea generally breaks, lies about  $2\frac{1}{2}$  cables westward of the southern extremity of the islet.

A light is exhibited, at an elevation of 161 feet (49<sup>m</sup>1), from a white square stone structure, with a red roof, 21 feet (6<sup>m</sup>4) in height, situated on the summit of Mamelles islet.

A bank, with a depth of 12 fathoms (21<sup>m</sup>9) over it, which was reported in 1928, lies about 4 miles westward of Mamelles islet.

Brisans rocks, lying about 4 miles south-westward of Mamelles islet and  $2\frac{1}{4}$  miles from Mahé island, are a group of rocks, above water and

*Chart 1072.*

sunken; the north-western above-water rock is 20 feet (6<sup>m</sup>1) high. There are several 8-fathom (14<sup>m</sup>6) patches in this vicinity.

**Caution.**—In the channel between Mahé and Praslin islands sounding does not give sufficient warning of the proximity of any of the dangers.

**North and Silhouette islands.—Anchorages.**—North island, 704 feet (214<sup>m</sup>6) high, lying about 14½ miles north-westward of Mahé island, has, from northward, a bare desolate appearance, only a few straggling trees showing near its summit. The settlement is situated on the north-eastern side of the island, off which there is anchorage in depths of 15 fathoms (27<sup>m</sup>4), rather close inshore; landing is difficult in ships' boats, but native canoes are available.

Silhouette island, lying about 3½ miles southward of North island, is mountainous and covered chiefly with coconut palms.

The highest part of Silhouette island is a ridge about one mile from the northern end, with two summits; of these, Mon Plaisir, the western summit, is 2,467 feet (751<sup>m</sup>9) high, and the eastern, 2,404 feet (732<sup>m</sup>7). This ridge is very precipitous on its southern side, which, with the hills on the eastern and southern sides of it, form an amphitheatre, enclosing a valley thickly planted with coconut palms. Round peak (*Lat.* 4° 29' S., *Long.* 55° 14' E.) and Castle peak are 2,046 and 1,691 feet (623<sup>m</sup>6 and 515<sup>m</sup>4) high, respectively; they are the most conspicuous summits on the eastern range, and rise abruptly from the sea. The southern side of the island presents long shelving faces of rock, descending from a considerable elevation to the water's edge; the coast is everywhere fairly steep-to.

An extensive bank, with depths of 7 fathoms (12<sup>m</sup>8) over it, the position of which is doubtful, was reported, in 1882, to lie about 4 miles west-south-westward of the western extremity of Silhouette island.

There is anchorage for vessels with local knowledge off the eastern side northward of Haddon point, the eastern extremity of Silhouette island, off a reef which is steep-to and dries about 6 feet (1<sup>m</sup>8). Landing may generally be effected at La Passe, a gap in the reef opposite a house, northward of Haddon point, where also is a small village.

Anchorage may also be had at Grande Barbe on the south-western side of the island, and landing can sometimes be effected at the lagoon on the southern side of the sandy beach of that bay.

**MAHÉ ISLAND.**—Mahé island, the largest and most important of the Seychelles group, had a population, in 1936, of 25,367; it is, generally speaking, densely wooded, its soil mostly of a reddish colour, and consists chiefly of decomposed granite.

**Aspect.**—Mahé island is traversed throughout by a range of hills and mountains, attaining in the northern part an elevation of nearly 3,000 feet (914<sup>m</sup>4); these are intersected by many deep ravines with perpendicular cliffs. Many of the summits of this range are conspicuous.

Mount Howard, 1,490 feet (454<sup>m</sup>1) high, at the northern end of the island, about one mile from North point, its northern extremity, is cone-shaped, and is conspicuous; North point attains an elevation of 450 feet (137<sup>m</sup>2).

*Charts 722, 1072.*

From the town of Victoria, on the eastern side of the island, 3½ miles

*Charts 721, 2899, 748b.*

*Chart 722 1072.*

south-south-eastward of North point, a valley runs westward, and at the northern end of this valley is Signal hill, 1,334 feet (406<sup>m</sup>6) high, on which is a flagstaff; rising from this valley, about one mile south-south-westward of Signal hill, is St. Louis hill, 913 feet (278<sup>m</sup>3) high, cone-shaped, and conspicuous. Trois Frères, three peaks running north-westward and south-eastward, the central and highest, situated about one mile south-south-westward of St. Louis hill, is 2,517 feet (767<sup>m</sup>2) high. Connected by a ridge with Trois Frères, and a short distance southward, is Morne Seychellois, the highest mountain in the Seychelles group; it has four peaks, ranging from 2,764 to 3,007 feet (842<sup>m</sup>5 to 916<sup>m</sup>5) in elevation. During the south-east monsoon the summit of this mountain is nearly always obscured by cloud.

*Chart 1072.*

Mount Simpson (*Lat.* 4° 38' S., *Long.* 55° 25' E.), 2,247 feet (684<sup>m</sup>9) high, about 1½ miles west-south-westward of St. Louis hill, is the most prominent of several conspicuous peaks on the range running westward from Morne Seychellois and on the southern side of North-West bay; it can be identified by a conspicuous thumb-shaped rock on its summit; Morne Blanc, about three-quarters of a mile south-south-westward of Morne Seychellois, is steep, with conspicuous cliffs about its upper part, and has a rounded summit, 2,206 feet (672<sup>m</sup>4) high.

Mount Harrison, 2,257 feet (687<sup>m</sup>9) high, is situated about ¾ miles south-eastward of Morne Seychellois; from it a deep valley extends north-north-westward, in which, at an altitude of 1,515 feet (461<sup>m</sup>8), stands a conspicuous house, and nearly 200 feet (61<sup>m</sup>0) below it are the church and convent of Misère.

From Mount Harrison the range extends through a 2,138-foot (651<sup>m</sup>6) summit, about 1½ miles east-south-eastward, to Mount Sebert, a conspicuous thumb-shaped peak, 1,803 feet (549<sup>m</sup>5) high, about 1½ miles eastward of Mount Harrison. Baty house stands on a detached mountain, 1,376 feet (419<sup>m</sup>4) high, about half a mile west-south-westward of Mount Sebert; Cascade church, on the coast, three-quarters of a mile northward of Baty house, is conspicuous owing to its size and whiteness.

From the 2,138-foot (651<sup>m</sup>6) summit, mentioned above, the range trends 1½ miles south-south-eastward to Castle peak. Castle peak is a most conspicuous mountain, and has three summits, the centre being bare rock, broad, and flat, 1,701 feet (518<sup>m</sup>5) high, with a conspicuous rock on its southern side in the form of a thumb; the other two summits are 1,649 and 1,674 feet (502<sup>m</sup>6 and 510<sup>m</sup>2) high, respectively.

Mount Lockyer, 1,241 feet (378<sup>m</sup>3) high, is situated at the southern end of the island, about 2½ miles north-westward of Capucin point, the south-eastern extremity of the island; it is bare and steep, and separated from the hills between it and Capucin point, the highest of which is 1,098 feet (334<sup>m</sup>7) high, by a valley. On the side of that valley, towards the western end, is a hill 620 feet (189<sup>m</sup>0) high, with, in 1903, a rather conspicuous clump of casuarinas on its summit.

**Meteorological tables.**—See page 54.

**North-western coast.**—**Islet and dangers.**—**Anchorage.**—From North point the north-western coast of Mahé island, which is fringed by a reef, trends about ¾ miles southward to the village of Belle Ombre, and thence ¾ miles west-south-westward to the north-

*Charts 721, 2899, 748b.*



*Chart 1072.*

eastern entrance point of Port Ternay; North-West bay is entered between this latter point and North point.

North islet, 51 feet (15<sup>m</sup>5) high, which is conspicuous when seen clear of the land, lies about 1½ cables west-north-westward of North point; a conspicuous tree, the top of which reaches an elevation of 79 feet (24<sup>m</sup>1), stood at the centre of this islet, in 1891. There is a boat channel between the islet and the coast.

A shoal, with a least depth of 3 fathoms (5<sup>m</sup>5) over it, lies about 2½ miles south-south-westward of North islet and three-quarters of a mile offshore.

Anchorage can be obtained by small vessels with local knowledge off the village of Belle Ombre.

From Belle Ombre (*Lat.* 4° 37' S., *Long.* 55° 26' E.) the coast trends about 3½ miles west-south-westward to the north-eastern entrance point of Port Ternay.

The head of Port Ternay is filled by a reef, over which the sea does not always break; this reef is steep-to, and does not show in any way. Port Ternay is well sheltered.

Cape Ternay, the south-western entrance point of Port Ternay and the north-western extremity of Ternay bluff, is steep-to; in 1891, a large wooden cross stood near its extremity.

**Off-lying bank.**—Requin bank, a coral bank with depths of 10 fathoms (18<sup>m</sup>3) over it, lies off the middle of North-West bay, about 4 miles westward of North islet.

**South-western coast.—Islands and dangers.—Anchorages.**—

Ternay bluff, a bold headland, 686 feet (209<sup>m</sup>1) high, covered with coconut palms, is connected with the main island by a narrow isthmus.

Conception island, 432 feet (131<sup>m</sup>7) high, lying about 1½ miles south-south-westward of Cape Ternay and three-quarters of a mile offshore, is covered with coconut palms. Landing here is difficult, the best place being on the northern side of the south-eastern extremity of the island.

Ternay pass, between Conception island and Ternay bluff, is free from dangers, but the current through it is strong and, during the south-east monsoon, invariably sets northward.

Port Launay, close south-eastward of Ternay bluff, affords anchorage to small vessels with local knowledge, but there is usually a swell here; there are depths of 3½ fathoms (6<sup>m</sup>4) near the north-western end of this port.

Thérèse island, 541 feet (164<sup>m</sup>9) high, lying about three-quarters of a mile south-south-eastward of the south-eastern entrance point of Port Launay and a quarter of a mile offshore, has a conical shape, and is covered with trees.

Port Glaud (Glacé), within Thérèse island, affords anchorage to small vessels with local knowledge; there are two islets lying on the coastal reef at the head of this bay.

Boileau bay is entered between Thérèse island and Lazare headland, about 5½ miles south-eastward; the shores of this bay are fringed in places by reefs.

Trois Dames, a rock with a depth of less than 6 feet (1<sup>m</sup>8), over which the sea breaks heavily, lies about one mile eastward of the southern extremity of Thérèse island and half a mile offshore. Isle Vache, a rocky islet, 177 feet (55<sup>m</sup>9) high, lies about three-quarters of

*Chart 1072.*

a mile east-south-eastward of Trois Dames ; it is steep-to and shows white from seaward.

Chauve Souris, a rock, 27 feet (8<sup>m</sup>2) high, lying on the coastal bank about a quarter of a mile north-westward of the northern extremity of Lazare headland, is conspicuous, and appears white against the coast from seaward. 5

There are several indentations on the shores of Boileau bay where good anchorage may be obtained by small vessels with local knowledge ; the best of these anchorages are in Anse Boileau, about 2 miles 10 north-north-eastward of Chauve Souris, and in Anse La Mouche, close northward of Lazare headland (*Lat.* 4° 45' S., *Long.* 55° 28' E.) ; Anse La Mouche is well protected from swell. The swell usually sets in as far as the anchorages in Boileau bay, but landing can generally be effected inside the reefs after passing through one of the openings in 15 them.

Lazare headland is covered with coconut palms, and is conspicuous on account of its two conical hills, the outer one 487 feet (148<sup>m</sup>4) and the inner one 689 feet (210<sup>m</sup>0) high ; Point Lazare, the southern extremity of this headland, is high and steep-to. 20

Between Point Lazare and Police point, about 3½ miles south-eastward, the coast, which is fringed in places by reefs, is indented by five small bays, named in order from northward, Baie Lazare (Poules Bleu), Anse Takamaka, Anse Intendance, Anse Corail, and Anse Bazacar ; these bays afford anchorage to small vessels with local 25 knowledge, but caution is necessary as the reefs are mostly steep-to.

Takamaka rocks, 12 feet (3<sup>m</sup>7) and one foot (0<sup>m</sup>3) high, respectively, lie about 2½ cables south-south-westward of the southern entrance point of Anse Takamaka ; the two Mascene rocks, the higher 32 feet (9<sup>m</sup>8) high, lie 1½ cables southward of the northern entrance point of Anse 30 Corail.

Police point has a rounded summit, 214 feet (65<sup>m</sup>2) high, covered with coconut palms, and is steep-to, except off its western side, where a rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies close offshore.

Between Police point and Capucin point, one mile eastward, the 35 coast recedes forming Police bay ; some rocks lie close offshore in the middle of this bay. There is generally a swell in the bay and, under such conditions, landing is impracticable.

Capucin rock, over which the sea breaks heavily, lies about half a mile southward of Police point, and is awash. 40

Capucin point is high and nearly steep-to ; a rock, 3 feet (0<sup>m</sup>9) high, lies about three-quarters of a cable southward of this point.

**Light.**—A light is exhibited, at an elevation of 331 feet (100<sup>m</sup>9), from a white masonry tower, 14 feet (4<sup>m</sup>3) in height, situated on Capucin point. 45

**Off-lying dangers.**—Pilot patches, lying about 2½ miles south-westward of Conception island, are a group of three coral patches, with a least depth of 10 fathoms (18<sup>m</sup>3) ; when over them, in fine weather, the bottom can be distinctly seen.

Stork patch, with a least depth of 3 fathoms (5<sup>m</sup>5), coral, lies in the 50 western approach to Boileau bay, about 2½ miles south-south-westward of Isle Vache ; the sea does not always break over this patch, but the swell increases near it. A bank, with a least depth of 10 fathoms (18<sup>m</sup>3) over it, lies about three-quarters of a mile west-north-westward of Stork patch. 55

*Charts 721, 2899, 748b.*

D\*

*Chart 1072.*

**North-eastern coast.—Dangers.—Beacon.**—From North point the coast trends about  $1\frac{1}{2}$  miles east-south-eastward and thence about a similar distance south-south-eastward to North-east point and is fringed by a reef; North-east point attains an elevation of 379 feet (115<sup>m</sup>5).

*Chart 722.*

From North-east point the coast trends about  $2\frac{1}{2}$  miles south-south-westward to the town of Victoria (*Lat.*  $4^{\circ} 37' S.$ , *Long.*  $55^{\circ} 27' E.$ ), and is bordered by a coral reef, covered with mud and sand, which dries in patches; this reef is intersected by boat channels.

Anse Etoile, a small bay, about half a mile south-westward of North-east point, has some houses on its north-western shore; there is a boat channel through the coastal reef in this vicinity.

Hodoul rock, lying on the coastal reef, about 2 cables east-south-eastward of Cédre point, the northern entrance point of Anse Etoile, is a whitewashed rock, 12 feet (3<sup>m</sup>7) high.

Between Anse Etoile and the town of Victoria, several small rocks, above water, lie close offshore.

A masonry beacon, surmounted by a triangle, painted in black and white horizontal stripes, stands on the coastal reef, about  $1\frac{1}{2}$  miles southward of Cédre point and close offshore.

**Port Victoria.**—Port Victoria, fronting the town of Victoria, is the principal harbour in Mahé island, and is sheltered from seaward by islands standing on detached coral reefs; the inner harbour is entered through a channel in the coastal reef. The town, which had a population, in 1936, of 8,190, is the capital and seat of government.

Morne Seychellois (page 71) stands about  $1\frac{1}{2}$  miles south-south-westward of the town.

**Regulations.**—Vessels must give 6 hours' notice at the Port office previous to departure; mail steamers are exempt. A copy of the quarantine regulations is placed on board each vessel on arrival.

Vessels wishing to enter the harbour, to obtain pratique, after dark must notify the Port Authority, by radio, prior to their arrival.

**Light.**—A light is exhibited, at an elevation of 38 feet (11<sup>m</sup>6), from a white circular masonry tower, situated on the northern edge of the coral reef forming the eastern side of the inner harbour.

**Islands and dangers.—Beacons.—Buoy.**—St. Anne island, the largest and northernmost of the group lying eastward of Port Victoria, is conical, 830 feet (253<sup>m</sup>0) high, and covered with bushes; on its northern shoulder, in 1943, stood a conspicuous casuarina tree, at an elevation of 305 feet (93<sup>m</sup>0). This island is fringed by a reef extending as much as  $1\frac{1}{2}$  cables offshore, except at its northern extremity, which is steep-to; on its western side is a white sandy beach and a few scattered houses; the southern extremity is low and sandy, with, in 1943, a conspicuous clump of casuarinas.

Red masonry beacons stand on the coasts of St. Anne island about  $5\frac{1}{2}$  cables eastward,  $3\frac{1}{2}$  cables south-eastward,  $6\frac{1}{2}$  cables west-south-westward, and  $4\frac{1}{2}$  cables westward, respectively, of the 830-foot (253<sup>m</sup>0) summit of this island; a white masonry beacon stands on the north-western coast of this island, about  $4\frac{1}{2}$  cables north-westward of the summit.

Beacon islet, 100 feet (30<sup>m</sup>5) high, lying about  $7\frac{1}{2}$  cables south-eastward of the eastern extremity of St. Anne island (*Lat.*  $4^{\circ} 36' S.$ , *Long.*

*Charts 1072, 721, 2899, 748b.*

*Chart 722.*

55° 30' E.), is covered with large boulders with scanty vegetation between them ; it shows up white and is the resort of numerous sea-birds. Landing on this islet is difficult.

Beacon islet is fringed by a shallow bank, except on its south-western side, extending as much as half a cable from it ; a pinnacle rock, 2 feet (0<sup>m</sup>6) high, lies 400 feet (121<sup>m</sup>9) westward of its northern extremity, and a detached shoal, with a depth of 13 feet (4<sup>m</sup>0) over it, lies three-quarters of a cable northward of the islet.

Southward of St. Anne island, and separated from it by St. Anne channel, is a large coral reef, covered with sand, which dries in patches, and on which are numerous coral heads ; Moyenne, Round, and Long islets lie on the northern part, and Cerf island, with Faon islet close south-eastward of it, on the southern part of this reef.

Moyenne islet, lying about half a cable within the northern extremity of this reef, is 201 feet (61<sup>m</sup>2) high, and there was, in 1943, a boulder on its summit. Round islet, 2 cables west-south-westward of Moyenne islet, is 87 feet (26<sup>m</sup>5) high and covered with trees ; there was, in 1943, one conspicuous casuarina, the top of which, at an elevation of 140 feet (42<sup>m</sup>7), stood near its summit. Long islet, lying about 2 cables south-eastward of Round islet, is covered with trees, mainly coconut palms, and had, in 1943, a conspicuous crag, 275 feet (83<sup>m</sup>8) high, on its summit ; a beacon, painted red, is situated on the north-eastern side of this islet, about 1½ cables north-north-westward of the conspicuous crag, and a beacon, painted white, stands on the western side of the islet, about 1½ cables westward of the same crag. The quarantine station stands on the western side of Long islet.

Cerf island, which is separated from Mahé island, by Cerf passage, is covered with coconut palms, except its north-western summit which is 270 feet (82<sup>m</sup>3) high and grassy, and the southern summit which is 350 feet (106<sup>m</sup>7) high with a few bushes on it ; the reef extends as much as 1½ cables from the south-western side of Cerf island.

Harrison rocks, above water and sunken, lie about one mile eastward of the south-eastern extremity of Long islet ; the highest rock is 26 feet (7<sup>m</sup>9) high. A detached shoal, with a least depth of 16 feet (4<sup>m</sup>9) over it, lies 1½ cables, and a pinnacle rock, with a depth of 15 feet (4<sup>m</sup>6), 2½ cables, west-south-westward of the highest rock.

Numerous shoals encumber the channels leading towards Port Victoria ; the positions of these dangers can best be seen on the chart.

A spherical buoy, painted in red and white horizontal bands, and surmounted by a red ball, marks a shoal with a least depth of 24 feet (7<sup>m</sup>3), lying on the north-western side of the fairway, about 1½ miles north-eastward of Victoria light-tower.

**Channels.—Buoys.—Beacons.**—There are three channels leading towards Port Victoria, viz., North entrance, St. Anne channel, and Cerf passage.

North entrance, between St. Anne (*Lat.* 4° 36' S., *Long.* 55° 30' E.) and Cerf islands, on the south-eastern side, and Mahé island, on the north-western side, was, in 1943, the only channel in use ; three conical buoys, painted black, mark shoals on the north-western and northern sides of the fairway, and six can buoys, painted red, mark shoals on the south-eastern and southern sides.

A triangular beacon, with a black and white topmark, stands on a detached reef, about 6½ cables south-south-eastward of Victoria light-

*Charts 1072, 721, 2899.*

*Chart 722.*

tower ; a similar beacon is situated on the coast about  $1\frac{1}{2}$  miles southward of the same light-tower.

St. Anne channel is not considered safe for vessels drawing more than 12 feet (3<sup>m</sup>7), without the assistance of a pilot ; there are several unmarked shoals at its western end.

A triangular beacon, with a red topmark, stands on a detached reef at the south-western end of St. Anne channel, about  $3\frac{1}{2}$  cables westward of Round islet.

10 Cerf passage, if buoyed, could be used by large vessels, but, as there are many shoals and the channel is intricate, it is not recommended and should not be attempted unless the light is favourable.

A triangular beacon, with a red topmark, stands on the edge of the coastal reef on the south-western side of Cerf passage, about  $1\frac{1}{2}$  miles south-south-eastward of Victoria light-tower ; a rock, 12 feet (3<sup>m</sup>7) high, lying close offshore,  $7\frac{1}{2}$  cables southward of this beacon, is painted white.

**Caution.**—The outer buoys, being in exposed positions, should not be relied on.

20 **Pilots.**—A pilot can be obtained by making the usual signals. The pilot will board vessels about 3 cables northward of the outermost buoys in the northern approach to Port Victoria.

Pilotage is not compulsory except for merchant vessels proceeding to the inner harbour, i.e. westward of a line drawn in a north-westerly direction through Victoria light-tower.

**Anchorage.**—The following anchor berths are available for vessels in the outer harbour at Port Victoria :—

(1) In depths of from 11 to 12 fathoms (20<sup>m</sup>1 to 21<sup>m</sup>9), fine sand and shells, about  $9\frac{1}{2}$  cables 058° from Victoria light-tower.

30 (2) In depths of from 64 to 65 feet (19<sup>m</sup>5 to 19<sup>m</sup>8), sand and coral, about  $8\frac{1}{2}$  cables 074° from the same light-tower.

(3) In depths of about 63 feet (19<sup>m</sup>2), sand and shells, about  $1\frac{1}{2}$  miles 089 $\frac{1}{2}$ ° from the same light-tower.

(4) In depths of about 10 fathoms (18<sup>m</sup>3), fine sand, about  $7\frac{1}{2}$  cables 35 112° from the same light-tower.

(5) In depths of 13 fathoms (23<sup>m</sup>8), coral, about 3 cables 048° from the same light-tower (*Lat. 4° 37' S., Long. 55° 28' E.*).

These anchorages are open northward, and a swell is sometimes felt. South-easterly winds seldom blow hard, and during the south-east 40 monsoon vessels may lie at single anchor with short scope, but during the north-west monsoon heavy gusts come off the high land.

During the north-west monsoon, when a swell sets into the anchorages mentioned above, sheltered anchorage can be obtained in the eastern end of St. Anne channel, under the lee of St. Anne island, in 45 depths of from 6 to 10 fathoms (11<sup>m</sup>0 to 18<sup>m</sup>3).

The berth to be taken by an incoming vessel will normally be indicated by signal, or she will be met by a pilot northward of the red and white spherical buoy, surmounted by a ball. Berths (1), (2), and 50 (5) may be taken by incoming vessels, without indication from the shore or pilot.

**Piers.—Mooring buoys.—Shoals.**—A pier, off which lies a mooring buoy, extends from the western side of St. Anne island ; there are shoals in this vicinity.

Another pier, with a mooring buoy off it, extends from the south- 55 eastern side of this island.

*Charts 1072, 721, 2899.*

*Chart 722.*

A small pier extends from the southern end of St. Anne island ; a shoal, with a least depth of 14 feet (4<sup>m</sup>3) over it, lies about three-quarters of a cable south-south-eastward from the head of this pier.

There are several mooring buoys in the approach to the inner harbour. 5

**Prohibited anchorage.—Foul ground.**—From a position about 4½ cables north-eastward of Victoria light-tower a pecked line is drawn on the chart in a north-north-easterly direction for about 1½ miles and thence in an east-north-easterly direction for about one mile ; anchorage is prohibited northward and westward of these limits. 10

About 6 cables east-north-eastward of the light-tower, two anchors and cables were, in 1943, lying on the bottom.

**Directions.**—A vessel approaching Port Victoria from eastward or southward should pass eastward and northward of St. Anne island, and bring the two beacons, with black and white topmarks, described on 15 pages 75-76, in line, bearing 209½°, which leads through the fairway of North entrance towards the entrance to the inner harbour, passing south-eastward of the red and white spherical buoy, surmounted by a ball.

A vessel approaching Port Victoria from other directions should steer 20 towards a position 9 cables north-eastward of the 830-foot (253<sup>m</sup>0) summit of St. Anne island, and then proceed as directed above.

**Inner harbour.—Shoals.**—The inner harbour of Port Victoria is formed by a basin in the coral reef about half a mile eastward of the town. The entrance channel, which has moderate depths, has a least 25 width of one cable ; within the harbour opens out in all directions into narrow gullies and creeks in the coastal reef.

A shoal, with a depth of 14 feet (4<sup>m</sup>3) over it, lies about 4½ cables west-south-westward from Victoria light-tower (*Lat.* 4° 37' S., *Long.* 55° 28' E.) and half a cable from the coastal reef ; a shoal, with a depth 30 of 4 fathoms (7<sup>m</sup>3), lies about a quarter of a cable south-south-westward of the shoal just described, and a shoal, with a least depth of 16 feet (4<sup>m</sup>9) over it, about 1½ cables farther south-south-westward.

**Piers.**—Victoria pier, nearly half a mile in length, extends from the town in an easterly direction to the western side of the inner harbour ; 35 warehouses are situated on the head of this pier, and on the northern side of the pierhead is a patent slip. Small vessels can lie alongside the pierhead but are normally secured with their sterns to the wall (*see inset plan on chart*) ; if lying alongside they require careful mooring and fending off to keep them clear of a reef which projects under 40 water. Three anchors, buried with their anchor shackle protruding, are used for securing vessels.

Between the south-western end of the pierhead and the shore are the custom and other warehouses, also some engineering works, which are built out from the pier ; only very small vessels can go alongside 45 this portion of the pier.

There are landing steps at the entrance to the patent slip and in the centre of the head of the pier ; the usual landing place is, however, on the southern side of the pier, at the shore end of the custom warehouses. There are other steps at the inshore end of the southern side 50 of the pier, which can be used by small boats at high water.

Hodoul jetty is situated at the head of the creek southward of Victoria pier and, with the inshore end of the main pier, forms a boat harbour ; the port office is situated at the head of Hodoul jetty, and

*Chart 722.*

the steps here can be reached by boats at any state of the tide. The boat harbour dries except close northward of the head of the jetty.

**Beacons.**—Beacons mark both sides of the inner harbour and of the channel into it ; there are six masonry pillars, painted black, on the north-western side, and five masonry pillars, painted red, on the south-eastern side. The outer beacon on the north-western side is situated about  $3\frac{1}{2}$  cables northward of Victoria light-tower, and is surmounted by a ball ; the second beacon from seaward is surmounted by a triangle, painted in black and white horizontal stripes ; the inner beacon on the north-western side, situated about 7 cables south-westward of the beacon just described, marks the edge of the reef on the northern side of the entrance to the creek through the coastal reef leading to Hodoul jetty.

The creek just mentioned is marked, about  $2\frac{1}{2}$  cables within its entrance, by a small masonry pillar beacon, painted black, on its northern side, and a similar beacon, painted red, on its southern side ; these beacons mark the edges of the coastal reef. There are also two perches, painted red, marking the edge of the coastal reef on the southern side of this creek in the approach to Hodoul jetty.

**Anchorage.**—The most convenient anchorage is opposite the large warehouse on the head of Victoria pier (*Lat.  $4^{\circ} 37' S.$ , Long.  $55^{\circ} 28' E.$* ). Vessels intending to enter the inner harbour should give due notice of their arrival, as the harbour is small, and the space in it is much restricted by local craft, which would have to be cleared before berthing a moderate-sized vessel.

**Directions.**—A vessel proceeding into the inner harbour should steer towards it with the second beacon from seaward on the north-western side of the entrance channel in line with the beacon standing on the coastal reef (page 74), bearing  $258^{\circ}$  ; this leads close southward of the shoals on the northern side of the channel and caution is necessary.

After passing southward of the outer beacon, surmounted by a ball, a vessel should alter course into the inner harbour, passing between the beacons on either hand.

Boats or small craft proceeding up the creek towards Hodoul jetty must pass southward of the black masonry beacon on the northern side of the entrance to the creek, and northward of Coal islet, lying about one cable further westward. The two perches, painted red, marking the southern side of the approach to Hodoul jetty, should be kept aboard, so as to avoid the reef on the northern side of the channel.

**Signals.**—The approach of incoming vessels is indicated by signals from the flagstaff on Signal hill.

**Communications.**—There is regular steamer communication with Madagascar, Mombasa and the East African ports, also with Bombay, Batavia, and Europe.

Victoria is connected with the general telegraph system. There is a radio station here ; see page 26.

**Port facilities.**—Fresh provisions are obtainable in limited quantities ; 48 hours' notice of requirements is advisable. Excellent fresh water, supplied in lighters, is available ; water is laid on to Victoria pierhead. There is an ice factory.

There is usually a small stock of coal ; coaling is carried out from lighters by bags. A small supply of Diesel oil is kept in stock.

*Charts 1072, 721, 2899.*

*Chart 722.*

Tugs and lighters are available.

There is an 8-ton crane on Victoria pierhead.

There is a small patent slip; for details, *see* Appendix 1.

There is a hospital where seamen are received.

**Shipping.**—During 1937, 61 vessels, totalling 178,690 tons, entered the port.

*Charts 722, 1072.*

**Coast.—Islets and dangers.—Beacons.**—From the town of Victoria the north-eastern coast of Mahé island trends  $5\frac{1}{2}$  miles south-eastward to Point La Rue and is bordered by a reef extending as far as one mile offshore, through which are several boat channels; Caiman rock, 2 feet (0<sup>m</sup>6) high, lies on this reef, about one mile south-south-westward of Victoria light-tower and three-quarters of a cable offshore.

*Chart 722.*

A beacon, standing on the edge of the coastal reef about  $1\frac{1}{2}$  miles south-south-eastward of Victoria light-tower (*Lat.*  $4^{\circ} 37' S.$ , *Long.*  $55^{\circ} 28' E.$ ), and the beacon, near the coast, about  $8\frac{1}{2}$  cables west-south-westward of the former beacon, are described on page 76; as stated on page 76, a rock, 12 feet (3<sup>m</sup>7) high, lies close offshore 9 cables south-eastward of the black and white beacon. About  $2\frac{1}{4}$  cables south-westward of this rock, on the cliffy face of a hill, there is a conspicuous light-coloured streak, the top of which is 498 feet (151<sup>m</sup>8) high; this is referred to as Natural Mark.

*Chart 1072.*

Cascade bay, about 2 miles west-north-westward of Point La Rue, affords landing at the mouth of a stream, except at very low water; there is a boat channel through the coastal reef leading to this bay.

Within Point La Rue rises a conspicuous conical hill, 818 feet (249<sup>m</sup>3) high; Point La Rue is a sloping cliff.

Anonyme, an islet, 130 feet (39<sup>m</sup>6) high, covered with coconut palms, lies on a detached reef one mile north-north-westward of Point La Rue, and has a boulder on its summit; Rat islet, 40 feet (12<sup>m</sup>2) high, lying at the edge of the coastal reef, about three-quarters of a mile east-south-eastward of Anonyme, is covered with scanty scrub; Tortue rock, about half a mile eastward of Rat islet, dries 2 feet (0<sup>m</sup>6), and the sea usually breaks heavily over it but in calm weather, about high water, it is sometimes scarcely visible.

Beacon islet (page 74), bearing less than  $332^{\circ}$  and well open north-eastward of Harrison rocks, leads north-eastward of Tortue rock.

There is a boat channel southward of Anonyme.

South-East island lies on the coastal reef about a quarter of a mile eastward of Point La Rue; a hummock at its northern end is 194 feet (59<sup>m</sup>1) high with some large boulders on it, and another hummock at its southern end is 205 feet (62<sup>m</sup>5) high and nearly bare.

At high water there is a boat channel between Rat islet and South-East island, on the eastern side, and the coast, on the western side.

From Point La Rue the eastern coast of Mahé island trends about 3 miles southward to Sel point and is fringed by a reef extending as far as half a mile offshore, over which the sea usually breaks; about halfway between these points is a break in the coastal reef which is used by native craft.

Sel point is low, shelving, and rocky; within it rises Oliver hill, a

*Charts 1072, 721, 2899, 748b.*



*Chart 1072.*

detached summit, 763 feet (232<sup>m</sup>6) high, which from eastward appears dark against the background.

Between Sel point and Capucin point, about 4½ miles southward, the coast forms two small bays, Royal bay and Anse Forban, separated by Lascars point, situated at the foot of Mount Lockyer; the coastal reef, over which the sea usually breaks, fringes the shores of these bays.

Souris islet (*Lat. 4° 44' S., Long. 55° 32' E.*), lying on the coastal reef, about a quarter of a mile south-westward of Sel point, is rocky, 45 feet (13<sup>m</sup>7) high, and has a few trees and a little vegetation on it; a small rock, 8 feet (2<sup>m</sup>4) high, lies between it and the coast.

A conspicuous white church stands on the coast, about one mile south-westward of Sel point; there is a passage through the coastal reef opposite this church, and landing can usually be effected on the shore here.

A narrow channel leads through the coastal reef to the shore at the head of Anse Forban.

Capucin point, also the light on this point, are described on page 73.

**Islands and dangers eastward of Mahé island.—Anchorages.**

—Recif islet, 156 feet (47<sup>m</sup>5) high, lying about 15 miles eastward of St. Anne island, has a conspicuous white rock like a building on its summit; it is uninhabited and is the resort of numerous seabirds. Sunken rocks extend about half a mile south-eastward and south-westward of the southern extremity of Recif islet, and a rock, 15 feet (4<sup>m</sup>6) high, lies nearly half a mile south-eastward of that point.

The bottom between Recif islet and St. Anne island is very uneven, and eddies and ripples are frequently met with.

Anchorage has been obtained in depths of 17 fathoms (31<sup>m</sup>1), sand and shells, with Recif island, bearing 155°, distant 1½ miles.

Renommée rock, which dries 3 feet (0<sup>m</sup>9), lies about 8½ miles north-eastward of Recif islet; Chimney rocks, above and below water, the highest of which is 20 feet (6<sup>m</sup>1) high, lie about 1½ miles east-south-eastward of Renommée rock, and are easily seen.

Frigate island, 400 feet (121<sup>m</sup>9) high, lying about 7½ miles south-south-eastward of Chimney rocks, is the easternmost of the Seychelles group, and is planted with coconuts; the north-eastern and eastern sides of this island are fringed by reefs, over which the sea breaks; Pyramid rock, above water, lies close off the eastern extremity of Frigate island, and a rock, with depths of less than 6 feet (1<sup>m</sup>8) over it, about half a mile south-eastward of Pyramid rock. L'Ilot, 80 feet (24<sup>m</sup>4) high, the western part of which is fringed by a sunken reef extending as much as a quarter of a mile offshore, lies about 1½ miles west-south-westward of Frigate island; a bank, with a depth of 45 feet (13<sup>m</sup>7) over it, lies about 2½ miles north-north-westward of L'Ilot, and Barracouta rock, over which the sea breaks, lies about half a mile east-south-eastward of this islet. Noddy rock, which dries 6 feet (1<sup>m</sup>8), and over which the sea usually breaks heavily, lies about half a mile northward of Frigate island.

There is good anchorage for vessels with local knowledge, off the north-eastern and south-eastern sides of Frigate island; the latter is used during the north-west monsoon.

H.M.S. *Teazer*, in 1870, found good holding ground in depths of from 8 to 11 fathoms (16<sup>m</sup>5 to 20<sup>m</sup>1), from 2½ to 7 cables northward of Pyramid rock (*Lat. 4° 35' S., Long. 55° 51' E.*). Care and local

*Charts 721, 2899, 748b.*

*Chart 1072.*

knowledge are necessary to effect a landing, the coastal reef appearing from a short distance as an unbroken line.

*Chart 721.*

**Islands and dangers southward of Mahé island.**—Platte island, 5 low and wooded, lying about 64 miles southward of Capucin point, is separated from the southern side of the Seychelles bank; it is visible from a distance of from 10 to 12 miles, is inhabited, and produces coconuts and guano. Extensive barrier reefs, over which the sea breaks heavily, surround the island, and were reported, in 1941, to 10 extend about 8 miles northward and north-westward; within the barrier reefs the lagoon is quite smooth, and landing is safe and easy. Numerous  $1\frac{1}{2}$ -fathom ( $2^m7$ ) coral heads lie within 2 miles westward of the island. There are two intricate passages through the reef on the north-western side, available for small vessels with local knowledge 15 only.

La Perle reef, reported to have a least depth of 12 feet ( $3^m7$ ) over it, lies about 10 miles south-westward of Platte island, and was examined, in 1875, by H.M.S. *Shearwater*; it appeared to be about  $3\frac{1}{2}$  miles long in a north-north-westerly and south-south-easterly direction, and no 20 dry sand or rocks were visible. A small isolated patch was reported, prior to 1875, a mile or two further westward, but it was not seen by H.M.S. *Shearwater*.

La Perle reef seems to lie on the southern edge of the bank on which Platte island is situated. 25

Le Constant bank, lying about 59 miles east-south-eastward of Platte island, is probably a prolongation of the Seychelles bank; it was discovered, in 1844, by a French vessel of the same name, had a least depth of 11 fathoms ( $20^m1$ ), coral, from which the depths increased to as much as 27 fathoms ( $49^m4$ ). The 11-fathom ( $20^m1$ ) patch 30 was placed in lat.  $6^\circ 19' S.$ , long.  $56^\circ 17' E.$ , but, in 1894, H.M.S. *Lapwing* found depths of 28 fathoms ( $51^m2$ ) at this position. The bank was reported to extend from 12 to 15 miles northward and southward, and 18 or 20 miles eastward and westward. In 1897, H.M.S. *Stork* sounded southward of the alleged position of the 11-fathom ( $20^m1$ ) patch, and 35 found depths of from 25 to 28 fathoms ( $45^m7$  to  $51^m2$ ) for a distance of 15 miles, when they rapidly deepened to 69 and 331 fathoms ( $126^m2$  and  $605^m3$ ), this being evidently the southern end of the bank.

Adelaide bank was reported, prior to 1879, to lie 35 miles east-south-eastward of Le Constant bank, but its existence is considered doubtful. 40

**Anchorages.**—H.M.S. *Teazer* anchored, in 1870, about 2 miles westward of Platte island, in depths of 5 fathoms ( $9^m1$ ).

There is also anchorage off the south-western side of the same island for vessels with local knowledge.

H.M.S. *Shearwater*, in 1875, anchored, in depths of  $7\frac{1}{2}$  fathoms 45 ( $13^m7$ ),  $1\frac{1}{2}$  miles from a long line of breakers on La Perle reef (Lat.  $6^\circ 00' S.$ , Long.  $55^\circ 18' E.$ ), but the swell was too heavy to allow a boat to venture within several hundred yards of the surf, at which distance there were depths of 4 fathoms ( $7^m3$ ); the breakers were not continuous, and were especially observed in three spots about a mile apart. 50

**AMIRANTE ISLES.**—General remarks.—The Amirante isles lie on a bank of coral and sand, the northern extremity of which is situated about 122 miles westward of the western extremity of Mahé

*Chart 721.*

island, and extends about 90 miles south-south-westward ; this bank has irregular depths, with masses of growing coral and nullipores. There are several islets on this bank, and a number of coral reefs, which dry.

The group is under the Seychelles government. All the islets, with the exception of Etoile cay, lying on the western side of the bank, about 23 miles from its southern extremity, Boudeuse cay, 16 miles south-westward of Etoile cay, and Ile des Neufs, about 15 miles south-eastward of Boudeuse cay, are inhabited, and planted with coconut palms ; all the islets are composed of coral, are flat, and none is more than 20 feet (6<sup>m</sup>1) high, but they are usually visible from a distance of from 10 to 14 miles.

Unless bound for one of these islets, this bank should be avoided, as sounding gives little or no warning of the approach to it, and the currents are strong and uncertain in direction ; also anchorage, when obtainable, is, generally speaking, untrustworthy.

**Tidal streams.**—**Current.**—In March and April, 1882, H.M.S. *Alert* found that the tidal streams were fairly regular throughout the Amirante group. The streams near the islets and shoals were found to take the direction of their edges, but, as a general rule, the flood stream set north-westward, and the ebb south-eastward, the streams turning at high and low water ; the greatest rate observed was 2½ knots.

The following exceptions to this general rule were noted :—At the anchorage off African islets, which lie about one mile within the northern extremity of this bank, the flood stream set southward and the ebb northward at a rate of about half a knot ; at the anchorage off Eagle islet, which lies about 13 miles south-south-westward of African islets, the directions of the streams were southward and northward, and the rates one knot. Off D'Arros islet, about 17 miles southward of Eagle islet, and off Marie Louise islet, about 46 miles farther southward, the flood stream set westward and the ebb stream eastward, at a rate of about 2 knots ; westward of Marie Louise islet, an eddy, formed during the flood stream, extended about 1½ miles and set directly back towards the islet.

Although H.M.S. *Alert* found the tides regular during the months of March and April, later experience shows that this is not always so ; and the tidal streams are sometimes strong and variable. When the ebb stream combines with the north-easterly current, it may attain a rate of from 4 to 4½ knots.

A strong current setting north-westward round the northern end of the Amirante bank has been experienced.

**Local weather.**—See page 45.

*Chart 724, plan of African islands.*

**African islets.**—African islets (*Lat. 4° 52' S., Long. 53° 24' E.*), two in number, about 10 feet (3<sup>m</sup>0) high and 1½ miles apart, lie on a reef of coral and sand, which dries ; they are covered with bush. In 1928, there was one coconut palm on the northern islet ; the southern islet has a large hut on its western side. There is periodical communication with Port Victoria, Mahé island.

*Charts 724, plan of African islands ; 721.*

The Amirante bank extends about one mile eastward and 4 miles westward of these islets. A heavy surf breaks on the south-eastern

*Charts 721, 2899, 748b.*

*Charts 724, plan of African islands ; 721.*

side of the bank fringing African islets during the south-east monsoon, and there is frequently a heavy sea off the northern end of this bank caused by the wind and current.

A shoal, over which the bottom could be clearly seen, was reported, in 1925, to lie about 5 miles north-westward of the northern extremity of the northern islet.

These islets are very dangerous to make when bearing more than  $180^{\circ}$  ; by daylight they may be seen from a distance of about 8 miles, but at night a vessel might be on the eastern reef without seeing them. From the observation spot, on a clear dark night, the breakers could not be seen 3 cables distant, neither could the islet be seen from the vessel 8 cables distant under similar circumstances.

*Chart 724, plan of African islands.*

**Anchorage.**—H.M.S. *Alert*, in 1882, anchored 8 cables westward of the northern islet in depths of  $7\frac{1}{2}$  fathoms ( $14^m2$ ), indifferent holding-ground ; in that position the vessel was sheltered from the long south-easterly swell, and landing was easily effected, except at low water.

In November, 1887, a German corvette anchored in depths of  $5\frac{1}{2}$  fathoms ( $10^m1$ ), about one mile north-westward of the southern islet ; here the anchor could be plainly seen lying on the coral rock. This berth was considered preferable to that mentioned above ; a schooner much closer inshore was in quite smooth water.

*Chart 721.*

**Eagle islet.**—Eagle islet is covered with trees, chiefly coconut palms, and is about 20 feet ( $6^m1$ ) high ; it is formed of coral rock, and is in many places bordered by low cliffs. The coast is fringed by a reef, extending as far as 3 cables from its southern side, and half a cable from its northern side, where there is a steep sandy beach, affording easy landing during the south-east monsoon.

This islet has been worked for guano, and a large heap of the "tailings" remain in front of the settlement, which is situated on the northern side of the islet, and is surrounded by a clump of casuarina trees. The islet is visible from a distance of about 12 miles, and is visited from Port Victoria periodically.

**Tidal streams.**—The tidal streams set from north to north-east with a rising tide and from west-north-west to south-west with a falling tide, attaining a rate of a quarter of a knot at neaps ; the west-going stream is weaker and more irregular than the other.

**Off-lying dangers.**—Remire reef, lying about  $1\frac{1}{2}$  miles eastward of Eagle islet (*Lat.*  $5^{\circ} 07' S.$ , *Long.*  $53^{\circ} 19' E.$ ), extends about  $3\frac{1}{2}$  miles in a north-easterly and south-westerly direction ; it dries in patches, and is steep-to on its south-eastern side, over which a heavy surf breaks. The channel between this reef and Eagle islet should not be attempted except in case of necessity.

Patches of 5 and  $5\frac{1}{2}$  fathoms ( $9^m1$  and  $10^m1$ ) lie within  $6\frac{1}{2}$  miles northward and  $4\frac{1}{2}$  miles north-north-westward of Eagle islet, respectively ; about 3 miles west-south-westward of this islet lies a patch, which looks shallow, but H.M.S. *Alert*, in 1882, could not find depths of less than 6 fathoms ( $11^m0$ ) over it ; a shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ), lies about  $2\frac{1}{2}$  miles southward of the islet, and about 7 miles south-south-westward of the islet a depth of 4 fathoms ( $7^m3$ ) was found on an apparently extensive bank.

Navigation between African islets and Eagle islet should be avoided

*Charts 721, 2899, 748b.*

*Chart 721.*

except in daylight and in fair weather, the bottom being foul in patches over the whole area; a good look-out should also be kept from the masthead, as, in favourable weather, the bottom may be plainly seen in depths of 12 fathoms (21<sup>m</sup>9).

**Anchorage.**—H.M.S. *Sealark*, in 1905, anchored in depths of 8 fathoms (14<sup>m</sup>6) about 2 cables from Eagle islet, with the eastern extremity bearing 137° and the western extremity 186°; the anchorage appeared to be good, and is protected by Remire reef.

10 *Chart 724, plan of D'Arros and St. Joseph islets.*

**D'Arros and St. Joseph islets.**—With the exception of a big clump of casuarina trees on D'Arros islet, the larger islets of this group are covered with coconut palms.

D'Arros islet is of the usual coral reef type, flat, and nowhere more than 10 feet (3<sup>m</sup>0) high; the tops of the trees are 86 feet (26<sup>m</sup>2) high, showing as a large square clump before the remainder of the islet is seen. It lies on a detached reef, which extends as far as 2½ cables from its south-western side; a shallow spit extends about 5 cables east-north-eastward of the north-eastern point of D'Arros islet. There is a settlement on the northern side of this islet.

St. Joseph islet, lying about 2½ miles east-south-eastward of D'Arros islet, is the largest and easternmost of a group of eight islets situated on a coral reef of atoll formation; the tops of the trees on this islet are 80 feet (24<sup>m</sup>4) high, and on its north-western end are a few huts.

25 Ressource and Fouquet islets lie on the north-eastern side of the atoll, between D'Arros and St. Joseph islets; they are planted with coconut palms, the tops of which are about 40 feet (12<sup>m</sup>2) high. Ile Poule, about 1½ miles southward of Ressource islet, is a sandbank, which dries about 6 feet (1<sup>m</sup>8); it has two bushes on it about 10 feet (3<sup>m</sup>0) high. Chien and Pelican islets, each 20 feet (6<sup>m</sup>1) high, on the south-western side of the atoll, have only a few coconut palms on them; Benjamin and Cascassaye islets, at the southern end of the reef, are mere sand-cays covered with bushes, from 10 to 20 feet (3<sup>m</sup>0 to 6<sup>m</sup>1) high.

35 On the western side of this atoll, close southward of a small sandbank and about 5 cables south-westward of Ressource islet, is a shallow boat passage, available at high water; the channel, in 1905, was roughly marked with stakes.

The channel, 3 cables wide, between D'Arros islet (*Lat. 5° 24' S., Long. 53° 18' E.*) and the St. Joseph atoll, is free from dangers. The reef extends 5 cables westward of Ressource islet, and the tidal streams run through the channel between this reef and the spit extending north-eastward from D'Arros islet with considerable strength; it should therefore be attempted with caution, especially as the edges of the reefs are difficult to make out, unless the sun is in a favourable position.

**Tidal streams.**—The tidal stream sets between west-south-west and west-north-west at a rate of from a quarter of a knot to 1½ knots at springs, from two hours after low water by the shore until two hours before the succeeding low water; the remainder of the time it is either slack or sets eastward or east-north-eastward at a maximum rate of half a knot.

*Chart 721.*

**Off-lying dangers.**—A shoal, with a least depth of 2½ fathoms

*Charts 721, 2899, 748b.*

*Chart 721.*

(4<sup>m</sup>6) over it, the southern extremity of which is situated about 2 miles northward of D'Arros islet, extends about 5 miles north-north-eastward.

About 5 miles west-south-westward of D'Arros islet a depth of 4 fathoms (7<sup>m</sup>3) was found, in 1882, by H.M.S. *Alert*, on a bank of some extent.

Between D'Arros and Eagle islets, the Amirante bank is encumbered with shoals and patches, and must be navigated with great caution. A vessel should always anchor at night in this locality, weather and sea permitting; if not an offing from the bank should be made.

*Chart 724, plan of D'Arros and St. Joseph islets.*

**Anchorage.**—H.M.S. *Sealark*, in 1905, reported that the best anchorage was northward of D'Arros islet, in depths of from 15 to 18 fathoms (27<sup>m</sup>4 to 32<sup>m</sup>9), with the north-western extremity of that islet bearing 231° and the eastern extremity 151°; the depths decreased rapidly from 35 fathoms (64<sup>m</sup>0). Small vessels anchored closer inshore and were completely out of the tidal streams.

*Chart 721.*

**Poivre islets.**—These islets, three in number, lie on a coral reef, which dries, close to the eastern edge of the Amirante bank and 19 miles southward of St. Joseph islet; these islets are covered with trees, chiefly coconut palms, but there are also clumps of casuarinas, 75 feet (22<sup>m</sup>9) high. The southern islet, which is uninhabited, is the largest of this group; the settlement stands on the north-eastern extremity of the northern islet, in a clump of trees. There is periodical communication with Port Victoria, Mahé island.

There is a safe passage through the reef leading to the settlement opposite a white masonry pillar, which was, in 1905, nearly obscured by trees; this passage is available for boats at all states of the tide. It is cleared of coral lumps, from time to time, and, in 1905, was marked by two wooden perches fixed on the reef; which, in line, led up the channel. At low water, it is necessary to wade a short distance, but at high water a boat can go right up to the beach.

**Outlying dangers.**—Bertaut reef (*Lat.* 5° 40' S., *Long.* 53° 14' E.), on the southern part of which is a small sand cay, lies 6 miles north-westward of Poivre islets; the sea breaks heavily over the steep edge of this reef.

A shoal, with a depth of 2 fathoms (3<sup>m</sup>7), coral, was reported, in 1931, to lie near the western edge of the Amirante bank, about 13 miles west-south-westward of Poivre islets.

**Anchorage.**—H.M.S. *Sealark*, in 1905, reported that the best anchorage was off the western end of the northern Poivre islet, where there is a considerable area with depths of about 12 fathoms (21<sup>m</sup>9) over it, well sheltered from the south-easterly wind and swell, with the northern extremity of the northern island bearing 090° and the south-western extremity 129°.

Anchorage may also be found, about 2 cables off the reef edge facing the settlement, in depths of from 14 to 20 fathoms (25<sup>m</sup>6 to 36<sup>m</sup>6), but it is more exposed than the other; the white masonry pillar faces this position, and was intended as a mark for anchoring.

**Tidal streams.**—**Current.**—At the first-mentioned anchorage the tidal streams set north-north-eastward, northward, and north-north-westward from three hours before high water to three hours after,

*Chart 721.*

at a rate of from a quarter of a knot to one knot, and from southward to westward, for the rest of the time, at a maximum rate of half a knot; there is a short period of slack water between the streams.

- 5 A strong current was experienced by H.M.S. *Pearl*, in November, 1904, between Poivre islets and Ile Desroches, lying about 20 miles eastward, setting north-westward. There were numerous tide-rips.

**Islets and dangers at the southern end of the Amirante bank.**—

- Etoile cay, lying 18 miles west-south-westward of Poivre islets and about 2 miles within the western edge of the Amirante bank, is a sand  
10 cay, 15 feet (4<sup>m</sup>6) high, situated on a coral knoll extending half a mile north-north-westward and south-south-eastward.

- Boudeuse cay, about 15 feet (4<sup>m</sup>6) high, lying at the south-western extremity of the Amirante bank, about 16 miles south-westward of  
15 Etoile cay, is a sandbank; this cay lies at the southern end of a bank, with a least depth of 4½ fathoms (8<sup>m</sup>2) over it, which extends about 5 miles northward and 6 miles north-eastward.

- Ile des Nœufs, about 18 feet (5<sup>m</sup>5) high, lying 14½ miles south-eastward of Boudeuse cay, is the southernmost islet of the Amirante  
20 group; it is low and sandy, with coral protruding from the beach. It is fringed by a coral reef, which extends about one mile south-westward of it, and the sea breaks, in depths of 4 fathoms (7<sup>m</sup>3), over a spit about one mile further westward.

- A shoal, with a least depth of 3 fathoms (5<sup>m</sup>5) over it, lies 3½ miles  
25 east-north-eastward of Ile des Nœufs; its position is generally indicated by tide rips.

- Marie Louise islet, lying 7 miles east-north-eastward of Ile des Nœufs, is low, sandy, and covered with trees; it shows up well in daylight, having a conspicuous row of casuarina trees, 90 feet (27<sup>m</sup>4)  
30 high, on its north-western side which, when seen from northward or southward, are in line and look like a square tower; as this islet is the only one of the southern group which has trees on it, it is easily identified.

- A coral reef fringes Marie Louise islet (*Lat.* 6° 11' S., *Long.* 53° 35 09' E.), extending 2½ cables offshore; a heavy surf breaks over this reef, rendering landing rarely practicable.

- Anchorage.**—**Wreck.**—H.M.S. *Alert*, in 1882, anchored one mile northward of Marie Louise islet in depths of 17 fathoms (31<sup>m</sup>1); the holding ground is indifferent, and the islet affords no shelter.

- 40 The wreck of a steamer, which sank in 1905, lies in the anchorage, and constitutes a serious danger to shipping as her masts are not visible, being a few feet under water.

*Charts 724, plan of Ile Desroches; 721.*

- ILE DESROCHES.**—This island, which is under the control of  
45 the Seychelles government, lies about 20 miles eastward of the Poivre islets, on the southern edge of a coral reef of the atoll character. The reef is nearly circular, with shallow water round the remainder of the atoll on which the island stands, with the exception of one deep opening, about one mile wide, at the north-western side, about 7 miles  
50 from the centre of the island, and another but much shallower opening, about 4 miles wide, on the eastern side, with a least depth of 3½ fathoms (6<sup>m</sup>4) in the fairway. The north-western passage is the only one by which a moderate-sized vessel can safely approach the

*Charts 2899, 748b.*

*Charts 724, plan of Ile Desroches ; 721.*

island. Sunken coral knolls, over which there is usually much swell, make crossing the bank by the eastern opening or in any other place exceedingly hazardous. The depths exceed 100 fathoms (182<sup>m</sup>9) close outside the reef in all directions.

*Chart 724, plan of Ile Desroches.*

Ile Desroches is fringed by coral reefs, which dry, and extend a mile from the eastern extremity and half a mile from the western end and southern side. The island is 14 feet (4<sup>m</sup>3) high, and, in 1905, was covered with casuarina trees about 118 feet (36<sup>m</sup>0) high. Coconut palms were then taking the place of casuarinas, which were being cut down ; as this felling and planting was taking place from the centre, outwards, the island, from a distance, appeared to be divided into two parts, the eastern and western casuarina groves.

Ile Desroches appeared, in 1905, to be washing away along its southern side, and also at its western point. Landing can be effected anywhere along the coast at all states of the tide, except during strong north-westerly winds ; at such times the islanders use a gap through the reef on the southern side.

The space within the reef appears to be remarkably clear of coral heads considering its formation.

**Off-lying dangers.**—Captain Bertaut, of Poivre, reported, in 1882, having found a small pinnacle rock, with a depth of 12 feet (3<sup>m</sup>7) over it, about 8½ miles north-north-eastward of the eastern extremity of Ile Desroches, and distinctly separated from the reef on which Ile Desroches lies by a distance of at least a mile, there being no bottom at depths of 50 fathoms (91<sup>m</sup>4) close round the pinnacle, and none in depths of 100 fathoms (182<sup>m</sup>9) close to the reef.

Shark rocks, lying about 5 miles northward of Ile Desroches (*Lat.* 5° 41' S., *Long.* 53° 41' E.), occupies the northern part of the atoll, and have a least depth of 1½ fathoms (2<sup>m</sup>7) over them.

**Anchorage.**—H.M.S. *Alert*, in 1882, anchored, in depths of 12 fathoms (21<sup>m</sup>9), about 7 cables north-westward of the observation spot. During the south-east monsoon this is an excellent anchorage ; a slight swell is felt.

**Tidal streams.**—At the anchorage off Ile Desroches the tidal streams were found by H.M.S. *Alert*, in 1882, to be slight, but near Shark rocks the flood stream set north-westward and the ebb south-eastward at a rate of nearly one knot.

**Directions.**—When bound for Ile Desroches a good look-out from aloft is the best guide, the shoal water showing plainly. The settlement should be brought to bear about 132°, and steered for on that bearing, observing that the tidal streams set strongly over the reef and across the pass ; a least depth of 10 fathoms (18<sup>m</sup>3) will be found in this track.

*Chart 721.*

### ALPHONSE, BIJOUTIER, AND ST. FRANCOIS ISLANDS.

—**Alphonse island.**—Alphonse island, lying near the centre of a coral reef, about 50 miles south-south-westward of Ile des Nœufs, is separated from a larger reef, about one mile southward, on which lie Bijoutier and St. Francois islands, by a deep channel ; the island, in 1905, had a clump of casuarinas on it but was mainly covered with coconut palms. It is under the Seychelles government.

*Charts 2899, 748b.*



*Chart 721.*

On the southern and south-eastern side of the island lies a large basin, with depths of 10 fathoms (18<sup>m</sup>3), from the entrance of which the centre of the island bears about 355°; the entrance channel is only 5 available for boats near high water, as it breaks right across at half tide.

**Tidal streams.**—The tidal streams in the channel southward of Alphonse island set westward and south-westward with the falling tide and between east and north-east with the rising tide, attaining 10 a rate, at neaps, of from half a knot to 2½ knots; eddies are formed in this channel.

There is no slack water here, and a vessel swings to the new tidal stream in about 5 minutes. Small tide-rips pass through the channel once every hour, and a heavy tide-rip, dangerous to boats, accompanies 15 the change of the stream.

**Anchorage.**—There are two or three spots in the vicinity of Alphonse island, where it is possible for vessels, with local knowledge, to find anchorage, but all are bad and dangerous, being exposed either to a south-easterly swell or to the tidal streams through the channel 20 southward of the island. One is off the extreme south-eastern corner of the reef in depths of 20 fathoms (36<sup>m</sup>6); another, in depths of 12 fathoms (21<sup>m</sup>9), is just eastward of the boat channel leading to the lagoon, and a third, used by small craft visiting the island, is off the eastern side, where there is another small boat channel over the reef.

25 **Bijoutier and St. Francois islands.**—The large reef (*Lat.* 7° 07' S., *Long.* 52° 45' E.), on which lie Bijoutier and St. Francois islands, dries in patches, and consists of a group of sand and coral banks; the depths over this reef are so shallow that boats cannot pass between Bijoutier and St. Francois islands at low water.

30 Bijoutier island, on the northern part of this reef, was, in 1905, covered with coconut palms; St. Francois island, 5½ miles south-south-westward of Bijoutier island, is a mere ridge, covered with coconut palms; there is also an islet, covered with coconut palms, lying on the reef, about 2 miles north-eastward of St. Francois island. 35 Bijoutier and St. Francois islands are visible from a distance of about 11 miles.

These islands are under the control of the Seychelles government.

*Charts 724, plan of Coetivy island; 721.*

**COETIVY ISLAND.**—Coetivy island, lying about 91 miles south-eastward of Platte island, was, in 1905, mostly covered with coconut palms, about 40 feet (12<sup>m</sup>2) high, but there was also a small group of very high conspicuous trees; it has several sand-hills, but none is higher than the coconut trees. The island is under the Seychelles government.

45 *Chart 724, plan of Coetivy island.*

The exports are coconut oil, copra, coconuts, and a small quantity of tortoise shell.

The island is fringed by a reef which extends about 2½ miles south-westward of its southern extremity and as far as 1½ miles from the 50 south-western side of the island; the coastal reef dries and the sea breaks heavily over it.

The settlement is situated near the middle of the western side of the island; there is a break in the coastal reef here, and landing can be

*Chart 724, plan of Coetivy island.*

effected on a sandy beach, but care must be taken to avoid some sunken rocks which lie from 2 to 3 cables offshore.

There is periodical communication with Port Victoria, Mahé island.

**Bank.—Shoal.**—Off the eastern side of Coetivy island the depths are great within one mile of the coastal reef, but a bank, with depths of less than 20 fathoms ( $36^m6$ ) over it, extends about 10 miles westward and south-westward of the island; the depths over the edge of this bank increase precipitously. 5

A shoal, with a least depth of 4 fathoms ( $7^m3$ ) over it, lies on this bank, about  $4\frac{1}{4}$  miles south-westward of the southern extremity of Coetivy island; the bottom here may be plainly seen. 10

A vessel passing southward of Coetivy island should give it a berth of at least 6 miles.

**Anchorage.**—There is anchorage anywhere off the western side of Coetivy island, and excellent shelter from the south-east trade wind can be obtained in the large bay on this side of the island, but the most convenient berth for communication is off the settlement (*Lat.  $7^{\circ} 06' S.$ , Long.  $56^{\circ} 17' E.$* ). Good anchorage was found by H.M.S. *Pearl*, in October, 1903, during the south-east trade, in depths of 6 fathoms ( $11^m0$ ), sand and coral, with the huts bearing  $112^{\circ}$  and the north-western point of the island  $032^{\circ}$ ; it is not advisable to anchor nearer the landing place, on account of the coral heads. 15 20

*Charts 721, 2899.*

**Outlying bank.**—Fortune bank the western side of which is situated about 26 miles eastward of Coetivy island, extends about 35 miles eastward. The bank has not been sufficiently examined to determine its extent, nor the least depth over it. The *Surat Castle*, between 1885 and 1891, sounded over a space between the parallels  $7^{\circ} 11' S.$  and  $7^{\circ} 25' S.$ , and the meridians  $56^{\circ} 45' E.$  and  $57^{\circ} 15' E.$ ; the least depth found was 10 fathoms ( $18^m3$ ), coral rock and coloured shells; an appearance of breakers was observed on the western edge of the bank and a short choppy sea all round. 25 30

Small vessels passing over the bank have found depths of 9 fathoms ( $16^m5$ ) in about lat.  $7^{\circ} 18' S.$ , long.  $57^{\circ} 15' E.$  The vessel *Sir Stephen Lushington*, while steering east for a distance of 7 miles, found depths of from 10 to 12 fathoms ( $18^m3$  to  $21^m9$ ), and could distinctly see the coral and sand bottom. By observation, the latitude was found to be  $7^{\circ} 07' S.$ , and Coetivy island (*Lat.  $7^{\circ} 06' S.$ , Long.  $56^{\circ} 17' E.$* ) to be 31 miles westward. About the same part of the bank, in 1886, the *Wasp* found depths of from 13 to 14 fathoms ( $23^m8$  to  $25^m6$ ). In April, 1830, the H.E.I. Company's ship, *Abercrombie-Robinson*, found regular depths of from 10 to 17 fathoms ( $18^m3$  to  $31^m1$ ), while running 5 or 6 miles north-by-eastward, over what was supposed to be the north-western end of the bank, in lat.  $7^{\circ} 06' S.$  and  $56^{\circ} 50' E.$  35 40 45

*Charts 721, 2899, 748b.*

## CHAPTER III

ALDABRA ISLANDS—ASSUMPTION ISLAND—COSMOLEDO GROUP—ASTOVE  
ISLAND—ST. PIERRE AND PROVIDENCE ISLANDS—FARQUHAR GROUP—  
AGALEGA ISLANDS—SAYA DE MALHA BANK

*Chart 718, plan of Aldabra island.*

**ALDABRA ISLANDS.—General remarks.**—Aldabra islands, lying between the parallels of  $9^{\circ} 21' S.$  and  $9^{\circ} 29' S.$  and between the meridians of  $46^{\circ} 12' E.$  and  $46^{\circ} 32' E.$ , were visited, in 1909, by Mr. J. C. F. Fryer, from whose description in the *Geographical Journal* of September, 1910, these remarks are principally taken. These islands, consisting of four principal ones, West island or Ile Picard, Polymnie island (*Lat.  $9^{\circ} 22' S.$ , Long.  $46^{\circ} 16' E.$* ), Middle or Malabar island, and South or Main island, divided by narrow passes, form an atoll. The islands are a dependency of the Seychelles and are leased to the Seychelles Company; the lessee's schooner visits the atoll periodically. The atoll is either coral or coral rock. The seaward face has abrupt overhanging cliffs from 12 to 15 feet ( $3^m7$  to  $4^m6$ ) high; the true surface of the islands is from 12 to 20 feet ( $3^m7$  to  $6^m1$ ) high, and the sand dunes reach an elevation of from 50 to 60 feet ( $15^m2$  to  $18^m3$ ). The islands are clothed in places by a thick, almost impenetrable, pemphis jungle, the plants being from 12 to 15 feet ( $3^m7$  to  $4^m6$ ) in height, and mangrove forests flourish, some of the clumps being 70 or 80 feet ( $21^m3$  or  $24^m4$ ) in height. The fringing reef is everywhere narrow, never extending more than 3 cables offshore, and is steep to all around except at the eastern end, where a bank extends about 3 miles.

The chief industries are the preparation and export of dried fish, calipee, dried turtle meat, fish oils, and a little copra. The mangrove forests are preserved by the government. The giant land tortoise is to be found in some numbers on South island, and also, though not commonly, throughout the rest of the atoll. Green turtle, of which there are two distinct groups, one resident and small in number, the other migratory and visiting the atoll in vast hordes from December to April to breed. The tortoise shell turtle occurs sparingly in the lagoon. Fish are abundant. There is very little agriculture. In 1923, wild goats were plentiful. Rats are a great plague throughout the islands, which are also infested with chigres. No shooting or taking of turtle is allowed.

The inhabitants are dependent on rain water. The lagoon is very shallow, but appears to have deepened since the

*Charts 2762, 597, 748b.*

*Chart 718, plan of Aldabra island.*

survey of 1878; the bottom is sandy in the middle and muddy near the edges. The shores of the lagoon are overgrown with dense mangrove swamps, which are eating away the coral.

**West island.**—West island is flat, and is nearly covered with the open or varied type of jungle; it is much indented on the lagoon side by mangrove creeks and swamps. The settlement is situated on West point, the western extremity of this island. 5

The western coast of West island is the only long sandy beach on any of the islands, and there the turtle land and deposit their eggs. 10

**Polymnie island.**—Polymnie island, lying about  $3\frac{1}{2}$  cables eastward of West island, is separated from it by Main channel.

**Middle island.**—Middle island, lying on the northern side of the atoll and close eastward of Polymnie island, is very similar to the other islands of this atoll but somewhat higher, especially at the eastern end where for a mile there are large trees; casuarina trees also grow on the western end of the island. 15

**South island.**—South island (Lat.  $9^{\circ} 27' S.$ , Long.  $46^{\circ} 23' E.$ ) extends the whole length of the group; it is nearly all faced with overhanging coral cliffs, from 12 to 15 feet ( $3^m7$  to  $4^m6$ ) high; this sea face is more barren than elsewhere on account of the spray and sand continually blown over it. The western part of the island is all pemphis jungle and eroded rock; near the centre are sand dunes, from 50 to 60 feet ( $15^m2$  to  $18^m3$ ) high, which are the highest points of the atoll. The eastern part of the island differs markedly from the pemphis country, for the rock is more or less flat and is covered with a thin layer of guano soil, while the jungle is open and varied. Hodoul point, the eastern extremity of the atoll, is bordered by a plain of white sand, partly covered with bushes. 25

In 1913, a conspicuous wreck was situated on the edge of the reef extending from the southern side of South island, about 4 miles from the south-eastern extremity of the island. 30

**Channels into the lagoon.**—There are four channels leading into the lagoon; these channels, deep at their entrance, soon shoal, and become as shallow as the rest of the lagoon. 35

West channel, between West and South islands, is about one mile wide, but is encumbered with islets and reefs, between which are several shallow passes, only available for boats at high water when the sea is smooth; the best of these passes, known as Lanier pass, lies in the southern part of this channel. Local knowledge is essential. 40

Main channel, or Great pass, the shores of which are fringed by reefs, which dry and are well defined even at high water, extends about  $1\frac{1}{2}$  miles south-south-eastward, with a least width of about one cable; the entrance points of this channel are composed of rocky cliffs, on which stand thick groves of casuarina trees. 45

About  $1\frac{1}{2}$  miles within the entrance of Main channel a reef divides it into two branches, both having moderate depths, but being only half the width of the outer channel. Both branches terminate in a labyrinth of coral patches, between which navigation should not be attempted. 50

Johnny channel, between Polymnie and Middle islands, was reported, prior to 1901, to be 25 feet ( $7^m6$ ) wide, with a depth of 4 fathoms ( $7^m3$ ), but it is only available for boats.

East channel, or Passe Houareau, between South island and the

*Charts 2762, 597, 748b.*

*Chart 718, plan of Aldabra island.*

eastern extremity of Middle island, is a narrow channel through the coral reef, available for boats; the reef, on either side, dries.

**Tidal streams.**—The flood stream runs through the passes for about 1h. 15m. after high water, and the ebb stream for a similar time after low water. Throughout Main channel and its branches the stream, at springs, attains a rate of  $6\frac{1}{2}$  knots, with scarcely any slack water, and at neaps of  $2\frac{1}{2}$  knots.

**Islets in the lagoon.**—Euphrates islet, lying near the western end of the lagoon, has a number of trees, about 40 feet ( $12^m2$ ) high, on it; Coconut islet (*Lat.  $9^\circ 24'$  S., Long.  $46^\circ 27'$  E.*), or Ile Michel, at the eastern end of the lagoon, is partly sandy with long grass, and has some casuarina and coconut trees, about 70 feet ( $21^m3$ ) high, on it. The remaining islets in the lagoon are composed of coral rock.

**Anchorages.**—During the south-east monsoon the best anchorage for small vessels with local knowledge is opposite the entrance to Lanier pass, about three-quarters of a cable from the reef. It is possible for a vessel to obtain anchorage off West point, but the anchorage space scarcely allows swinging room.

During the north-west monsoon anchorage may be found south-eastward of Hodoul point on the bank extending from the eastern end of South island; this bank, however, has not been closely examined, and should, therefore, be approached with caution.

There is good anchorage about  $1\frac{1}{2}$  miles within the entrance to Main channel, in depths of about 9 fathoms ( $16^m5$ ), coral, with Round apex, the southern extremity of West island, 40 feet ( $12^m2$ ) high, bearing about  $234^\circ$  and open south-eastward of the south-eastern point of that island; a vessel should moor with open hawse eastward and with a good scope on each cable, the holding ground being bad, and the strong tidal streams rendering it likely that the anchors may come home; no mooring swivel is required, the trade wind causing the vessel to swing the same way and thus keeping the hawse clear. It is quite smooth at this anchorage, but the strong tides make it inconvenient.

Small vessels with local knowledge can pass through Main channel into the lagoon, which has anchorage over a limited space, in depths of 4 fathoms ( $7^m3$ ).

*Chart 2762, with plans of Assumption island and St. Thomas anchorage.*

**ASSUMPTION ISLAND.**—Assumption island, which is under the control of the Seychelles government, lying about 18 miles southward of Aldabra islands, was visited, in 1909, by Mr. J. C. F. Fryer (*see* page 90); it is an elevated coral reef with a maximum rocky elevation of 20 feet ( $6^m1$ ), which is found on the western coast about  $1\frac{1}{2}$  cables from the high water mark. The western coast consists of a sloping sandy beach, but the greater part of the island is bounded by abrupt overhanging cliffs, like the Aldabra islands; a spit extends about 3 cables from the south-western extremity of the island. On the south-eastern side are a series of large sand dunes, sloping on their seaward sides and precipitous on their inland sides, about 95 feet ( $29^m0$ ) high, to seaward of which there is no fringing reef, though the water is shoal for a distance of about a quarter of a mile offshore.

Assumption island was apparently at one time larger than it is now, and will probably in time split up into a number of isolated rocks, and

*Charts 2762, 597, 748b.*

*Chart 2762, with plans of Assumption island and St. Thomas anchorage.* may disappear altogether. The island is covered with low tangled vegetation, and the surface is largely coated with guano, which is exported.

There is a conspicuous shed about halfway between the settlement 5 and the northern extremity of the island.

There is a pier extending from the north-western side of the island (Lat.  $9^{\circ} 46' S.$ , Long.  $46^{\circ} 31' E.$ ), about a mile north-eastward of the western extremity; the pier was in ruins, in 1945, and was difficult to identify from seaward. 10

**Anchorage.—Beacons.**—The best anchorage during the south-east monsoon is St. Thomas anchorage, in depths of 10 fathoms ( $18^m3$ ), about 2 cables north-westward of the settlement, with a conspicuous clump of trees northward of the settlement bearing about  $108^{\circ}$ , and the north-western extremity of the island about  $182^{\circ}$ . 15 In the bay on the lee, or western, side of the island anchorage might be found anywhere at about three-quarters or one cable from high water mark, but there is not room for a vessel to swing, and she would have, probably, depths of from 28 to 30 fathoms ( $51^m2$  to  $54^m9$ ) under the stern. There is reported to be anchorage off the south-eastern 20 point of the island during the north-west monsoon.

In 1945, it was reported that no loading was done from St. Thomas anchorage but from an anchorage about 2 cables offshore north-eastward of the pier, in depths of from 20 to 25 fathoms ( $36^m6$  to  $45^m7$ ), with two stone beacons, about 10 or 12 feet ( $3^m0$  or  $3^m7$ ) high, 25 situated eastward of the pier, in line bearing about  $150^{\circ}$ ; the rear beacon is difficult to see when approaching this anchorage in the forenoon.

**Tidal streams.**—At St. Thomas anchorage the flood stream sets west-south-westward and attains a rate of 3 knots at springs; the 30 ebb stream sets east-north-eastward and attains a rate of one knot at neaps. With the west-going stream tide-rips and eddies may be encountered off the south-western end of the island.

*Charts 718, plan of Cosmoledo group; 2762.*

**COSMOLEDO GROUP.—General remarks.**—This group of 35 islands and islets, lying about 58 miles eastward of Assumption island, was visited, in 1909, by Mr. J. C. F. Fryer (*see* page 90); the group is of typical atoll formation, but the land rim is very imperfect, not more than one-half the atoll's circumference being capped with land. All the islands show signs of great erosion, both on the seaward and 40 lagoon sides. A number of low coral islands and islets lie on the ring surrounding the central lagoon, which is shallow and encumbered by rocks. The outer edge of the reef, which dries from 2 to 3 feet ( $0^m6$  to  $0^m9$ ), is steep-to; the reef extends about  $2\frac{1}{2}$  cables seaward of the islands. 45

*Chart 718, plan of Cosmoledo group.*

The Cosmoledo islands are leased from the Seychelles government; the principal settlement is on Menai island, at the western end of the group, but there is a smaller camp on Wizard island, at the south-eastern end of the atoll. The inhabitants are mostly dependent on 50 rain water; in 1909, there was a well on Wizard island.

The industries are turtle catching, fish curing, and guano digging, all of which are exported to the Seychelles.

*Charts 2762, 597, 748b.*

*Chart 718, plan of Cosmoledo group.*

**Islets on the northern side.**—West North islet, 25 feet (7<sup>m</sup>6) high, and East North islet, 15 feet (4<sup>m</sup>6) high, lie on the northern extremity of the atoll reef, about 7 cables apart; West North islet (*Lat.* 9° 39' S.,

5 *Long.* 47° 34' E.) is rocky and covered with bush.

Ile du Trou, a rock, lies about 2½ miles east-south-eastward of East North islet; Golette islet, 10 feet (3<sup>m</sup>0) high, lies about one mile farther east-south-eastward and close to the edge of the reef, through which there appears to be an opening close south-eastward of this islet.

10 **Islands on the western side.**—Menai island is the largest and westernmost of the group. In the centre of the lagoon side of the island are tall mangroves, 60 feet (18<sup>m</sup>3) high; at the southern end, a clump of trees forms an apex 45 feet (13<sup>m</sup>7) high, and on the north-eastern part is a ridge of sand-hills about 40 feet (12<sup>m</sup>2) high, with  
15 a growth of stunted casuarinas; elsewhere the island is low and fairly open. The settlement is near the middle of the island and is indicated by a flagstaff.

Johannes point, on the western side of Menai island, about one mile from its southern end, appears to project considerably when seen from  
20 southward; it is formed of rock, and has two trees standing alone at its extremity.

During the south-east monsoon landing can be effected, at high water, in the bay northward of Johannes point, and even at low water by landing on the high outer edge of the reef and wading, but at times  
25 there is too much swell.

Observation islet lies about 5½ cables east-north-eastward of the north-eastern extremity of Menai island, and Middle islet, 10 feet (3<sup>m</sup>0) high, lies about 8½ cables further east-north-eastward; Chauve Souris islet lies close eastward of the middle of Menai island, and  
30 Mastique islet about 2½ cables southward of its southern extremity.

**Islands on the southern side.**—South island, the southernmost of the group, has on it some sandhills, about 20 feet (6<sup>m</sup>1) high, covered with bush; towards its western end stand some mangroves, about 25 feet (7<sup>m</sup>6) high. Pagoda islet, 20 feet (6<sup>m</sup>1) high, lies 6 cables east-  
35 north-eastward of South island.

**Islands on the eastern side.**—Polyte islet, lying at the eastern extremity of the atoll, has a hummock, 35 feet (10<sup>m</sup>7) high, at its southern end.

Wizard island, 5 cables southward of Polyte islet, has a sandhill,  
40 55 feet (16<sup>m</sup>8) high, at its northern end and another, 40 feet (12<sup>m</sup>2) high, at its southern end; this island is sandy and fairly open. At its northern end is a fishing station.

**Lagoon.**—*Entrances.*—The lagoon, as already stated, is encumbered with rocks, but its north-eastern part is moderately clear. There are  
45 several breaks in the barrier reef, but only two passes through it, viz., South-West passage and South-East passage, in both of which the tidal streams run strongly.

South-West passage, 1½ miles north-westward of South island, leads into a shallow part of the lagoon and is, therefore, useless except as  
50 a boat passage. In the south-east monsoon it is tolerably smooth at the entrance, but there is a beam swell.

South-East passage, midway between Pagoda islet and Wizard island (*Lat.* 9° 44' S., *Long.* 47° 39' E.), is narrow and ill-defined, the reefs at the sides not being steep-to and the water so clear that the

*Chart 718, plan of Cosmoledo group.*

bottom is almost as distinct in depths of 5 fathoms ( $9^m1$ ) as in depths of 2 fathoms ( $3^m7$ ). During the south-east monsoon wind and sea set straight into this pass and, although it becomes smooth after passing the line of breakers, is very rough at the entrance.

About 6 cables within its entrance South-East passage is divided into two branches by a reef awash. The eastern branch, which leads into the clearest part of the lagoon, is somewhat tortuous; the reef on the eastern side of this branch is the plainest to be seen.

The best pass over the reef for boats is close northward of Middle islet; there are depths of 3 feet ( $0^m9$ ) in this pass at high water, neaps.

**Anchorage.**—During the south-east monsoon there is anchorage in depths of from 8 to 13 fathoms ( $14^m6$  to  $23^m8$ ), about a cable from the edge of the reef off the north-western part of Menai island, but the bank is very steep, and a strong gust would probably send a vessel off into deep water, though, in 1878, H.M.S. *Fawn* rode well here, with a depth of 40 fathoms ( $73^m2$ ) under her stern when swung offshore. The sea here is smooth and little swell passes round the island.

During the north-west monsoon it is reported that there is anchorage in depths of from 5 to 10 fathoms ( $9^m1$  to  $18^m3$ ), eastward of the northern part of Wizard island, and there is anchorage at the entrance to South-East passage, for small vessels with local knowledge.

**Tidal streams.**—At the anchorage off Menai island the tidal streams are strong; the ebb stream sets north-eastward, augmenting the ordinary set of the equatorial current round the island. The flood stream, during neaps, barely neutralises the current; at other times it sets south-westward.

The rate of the outgoing stream in South-West passage is from 4 to 6 knots, and in South-East passage 4 knots.

*Charts 718, plan of Astove island; 2762.*

**ASTOVE ISLAND.**—Astove island, which is under the control of the Seychelles government, lying 23 miles south-south-eastward of the Cosmoledo group, was visited, in 1909, by Mr. J. C. F. Fryer (see page 90); it is of atoll formation and is characterised by having a very perfect land rim, which is only broken by one pass. There are sandhills at intervals round the island, those on the north-eastern and eastern parts being the highest, rising to an elevation of about 45 feet ( $13^m7$ ). The settlement, near which stands a flagstaff, is situated on the western side of the island, about  $8\frac{1}{2}$  cables from its northern extremity.

*Chart 718, plan of Astove island.*

The western side of the island (Lat.  $10^\circ 06' S.$ , Long.  $47^\circ 45' E.$ ) from a position about 2 cables southward of the settlement as far as the northern extremity is covered with coconut palms, and a single palm stood, in 1909, near the south-eastern corner of the lagoon. The island is mostly covered with low bush, though strips of thick jungle occur.

Maize, tobacco, and vegetables are grown; in 1931, there was a considerable quantity of guano. Besides agriculture there is fish curing and turtle catching.

There is occasional communication with the Seychelles.

**Dangers.**—The south-eastern point is low and rocky, with breakers extending about 5 cables offshore, and the water appears green for

*Charts 2762, 597, 748b.*



*Chart 718, plan of Astove island.*

about a mile south-south-eastward. Along the eastern side, the edge of the reef is distinctly marked about 2 cables offshore, where the sea breaks. The northern end of the island is fringed by a reef over which the sea breaks heavily. On the reef off the north-western extremity of the island lie a large anchor and a cannon of ancient make. At other parts, the reef is steep-to and there are no outlying dangers.

**Lagoon.**—The lagoon has depths of from 3 to 4 feet ( $0^m9$  to  $1^m2$ ); there is no channel through the pass, mentioned above.

- 10 **Anchorage.**—**Mooring buoys.**—During the south-east monsoon, a vessel may secure to the reef on the western side of the island close westward of the settlement by sending a kedge to the reef; if a hawser is used it should be buoyed to keep it clear of the coral. During the north-west monsoon an anchor may be dropped close to the reef on
- 15 the lee side.

In 1935, a mooring buoy was laid about 400 feet ( $121^m9$ ) northward of the settlement, for vessels loading guano.

- From about 1st May to 15th November, which is the guano season, the south-east monsoon blows with little variation in direction or force
- 20 and vessels moored to the buoy will ride head to wind; the sea is then generally smooth and little swell is felt.

A mooring buoy, laid westward of the north-western extremity of the island, lies about  $1\frac{1}{2}$  cables outside the edge of the reef; leading marks, in line, bearing  $112^\circ$ , lead in to this buoy.

- 25 *Chart 724, plan of Providence and St. Pierre islands.*

**ST. PIERRE AND PROVIDENCE ISLANDS.**—**St. Pierre island.**—**Anchorage.**—St. Pierre island, lying about 182 miles east-

- north-eastward of Astove island, is formed of raised coral; it is from 15 to 30 feet ( $4^m6$  to  $9^m1$ ) high, and is bare, except for a clump of
- 30 casuarina trees, the top of which is about 40 feet ( $12^m2$ ) high, standing on its northern part. In 1941, there was a considerable number of red-roofed houses in the north-western part of the island. The island (*Lat.  $9^\circ 10' S.$ , Long.  $50^\circ 43' E.$* ), which belongs to the Seychelles government, is frequented by large numbers of sea birds in September and
- 35 October, so that the bare coral surface has become largely phosphatised. In 1932, there was very little guano.

- The island is surrounded by abrupt coral cliffs, from 8 to 10 feet ( $2^m4$  to  $3^m0$ ) high, which have been undercut and worn into "blow-holes" by the ceaseless swell, which causes jets of water to be thrown
- 40 up by each wave; flat shelves have also been worn away on the south-eastern corner.

Depths of about 300 fathoms ( $548^m6$ ) are found at a distance of half-a-mile offshore all round the island.

- A pier has been constructed by the Guano Company at which
- 45 landing is easy; but, in 1928, it was in a bad state of repair. It is also possible to land at two small indentations at the northern end of the island, but only in fine weather, and at low water, when a small extent of sand dries.

- Anchorage can be obtained, in depths of 20 fathoms ( $36^m6$ ), coral,
- 50 with the pier bearing  $180^\circ$ . The holding ground is bad, and a vessel should always be ready to put to sea should the wind freshen from northward.

**Providence and Cerf islands.**—A reef, the northern extremity of

*Charts 2762, 2899, 597, 748b.*

*Chart 724, plan of Providence and St. Pierre islands.*

which is situated about 20 miles east-north-eastward of St. Pierre island, extends about 25 miles southward; Providence and Cerf islands lie near its northern and southern ends, respectively, and there are many sand cays on this reef, also banks, which dry about 4 feet (1<sup>m</sup>2). At from one to 1½ miles from its western edge there are depths of over 100 fathoms (182<sup>m</sup>9). The eastern side of the reef has not been examined from seaward, the prevailing south-easterly winds and heavy seas rendering it unapproachable. On that side are several openings, but no passage, even for a boat, has been found anywhere across the reef at low water. 5 10

Providence island stands with its northern end about 1½ miles within the northern part of the reef. It is well wooded, chiefly by coconuts, and an avenue of casuarina trees, 50 feet (15<sup>m</sup>2) high, traverses the centre of the island from east to west, under the shade of which is the village; there is a long low red-roofed building near the western extremity of the island. The island is under the jurisdiction of the Seychelles government, and was leased, in 1904, by a firm from there. The only export is coconut oil, and the output is small. Turtle are caught between January and March. The island is visited periodically by a vessel from the Seychelles. 15 20

Landing is attended with risk at all times, but in fine weather it can be effected over the reef, with the village bearing about 097°.

Cerf island, locally known as South banks, is one of a number of sand cays; in 1940, this island and the surrounding sand cays formed 25 one island, which was planted with coconut palms, the tops of which were about 35 feet (10<sup>m</sup>7) high. There is a flagstaff on Cerf island (Lat. 9° 31' S., Long. 51° 00' E.). During the south-east monsoon landing is easy at or near high water.

**Anchorage.**—The most convenient anchorage from which to communicate with Providence island is, in depths of 19 fathoms (34<sup>m</sup>7), sand and coral, with the village boat-house bearing about 119° and the northern extremity of the island about 046°; caution is necessary, as the depths decrease very rapidly; this anchorage is free from much swell during the south-east monsoon, but is exposed to the wind. 35 H.M.S. *Sealark*, in 1905, anchored in this position, but was informed by the manager of the island that a better anchorage could be found in depths of 12 fathoms (21<sup>m</sup>9), one or 2 cables farther southward.

The most sheltered anchorage is in depths of 10 fathoms (18<sup>m</sup>3) with the northern end of Cerf island, bearing about 142°, distant 40 2 miles; the bottom here is more even, and anchorage depths extend farther from the reef.

South-easterly winds blow quite nine months of the year, but in January and February, when north-westerly winds are strong at times, it is reported that vessels can anchor eastward of Providence 45 island.

**Tidal streams.**—At the anchorage off Cerf island, the tidal stream sets northward at a rate of from a quarter of a knot to half a knot (at springs possibly more), while the tide is rising by the shore, and south-westward at about the same rate, but irregularly, while the tide is falling. The streams are slack for about an hour at the turn of the tide. At the anchorage off Providence island there is a marked difference in the streams; they are very much stronger, and set northward from 3 hours before high water until the succeeding low water, 50

*Chart 724, plan of Providence and St. Pierre islands.*

at a nearly constant rate of  $1\frac{1}{2}$  knots (at 5 days after the change of the moon), then slackening and running south-south-westward for about 3 hours at a rate of nearly  $1\frac{1}{2}$  knots, turning rapidly after that again northward.

**Outlying dangers and banks.**—Wizard reef, lying 23 miles northward of Providence island, dries near its western end; a depth of 24 fathoms (43<sup>m</sup>9) was obtained off the eastern extremity of this reef, elsewhere it is steep-to. It extends  $2\frac{1}{2}$  miles in an easterly and westerly direction and is about one mile wide.

In 1884, a resident on the Farquhar islands reported the discovery of a shoal with a depth of  $4\frac{1}{2}$  fathoms (8<sup>m</sup>7) over it, lying about 15 miles east-south-eastward of Providence island.

*Chart 2899.*

Umzinto bank, discovered, in 1896, by a steam vessel of that name, lies about 20 miles east-south-eastward of Cerf island, and has a least depth of 11 fathoms (20<sup>m</sup>1), coral, over it; it is steep-to.

A bank, with a depth of 11 fathoms (20<sup>m</sup>1) over it, was reported, in 1884, to lie about 13 miles north-north-westward of Farquhar islands, a group about 35 miles south-south-eastward of Cerf island; H.M.S. *Sealark*, in 1905, obtained a sounding of 890 fathoms (1627<sup>m</sup>6) in this position.

A bank, with a depth of 8 fathoms (14<sup>m</sup>6) over it, was reported, in 1935, to lie about 31 miles north-westward of Farquhar islands (Lat.  $10^{\circ} 10' S.$ , Long.  $51^{\circ} 10' E.$ ).

McLeod bank was discovered, in 1818, by Captain D. McLeod, commanding the *Marquis of Huntley*. The bank was sounded over for a distance of 7 miles in a northward direction in a short choppy sea, and a least depth of 10 fathoms (18<sup>m</sup>3) was obtained in lat.  $9^{\circ} 57' S.$ , long.  $50^{\circ} 20' E.$  This bank has not been closely examined. H.M.S. *Pearl*, in 1903, obtained depths of from 12 to 15 fathoms (21<sup>m</sup>9 to 27<sup>m</sup>4), sand and coral, for about one mile east-south-eastward from a position in lat.  $9^{\circ} 59' S.$ , long.  $50^{\circ} 22' E.$ ; the bottom could be plainly seen, and the edge of the bank was very steep.

*Chart 718, plan of Farquhar group.*

**FARQUHAR GROUP.**—General remarks.—This group of islands, a dependency of the Seychelles, lies on an atoll. The central lagoon is shallow, and is encumbered with banks and patches, which dry; it is only available for boats.

The barrier reef is steep-to except on its north-western side, where a sandbank, with a least depth of 6 fathoms (11<sup>m</sup>0) over it, the bottom being plainly visible, extends about  $3\frac{1}{2}$  miles north-westward of the western extremity of the atoll; a bank, with depths of less than 5 fathoms (9<sup>m</sup>1), fringes the north-western side of the atoll, extending to as much as  $4\frac{1}{2}$  cables from it.

The industries are chiefly collecting copra, cultivating maize, and drying fish; there is a number of coconut trees on the islands.

**Local weather.**—See pages 45-46.

**Islands.**—North island, lying at the north-eastern end of the atoll, is flat, with an average elevation of about 10 feet (3<sup>m</sup>0); at Grande Poste, the settlement near the western extremity of the island, is a sand dune about 40 feet (12<sup>m</sup>2) high, and another sand dune, about 20 feet (6<sup>m</sup>1) high, is situated near North point, the northern

*Charts 2899, 597, 748b.*

*Chart 718, plan of Farquhar group.*

extremity of the island. The barrier reef extends about 3 cables northward and 7 cables westward of North point.

South island, lying about  $4\frac{1}{2}$  cables south-south-westward of North island, is visible from the masthead for a considerable distance. A 5 ridge of sand dunes, about 70 feet ( $21^m3$ ) high, extends along the seaward side of this island; Manaha hill, 50 feet ( $15^m2$ ) high, forms its north-eastern point. There are clumps of coconut trees on the flat, lagoon side, and also at the northern end of South island.

In 1932, the whole of South island was under cultivation. 10

Manaha islets, three in number, lying between North and South islands, are low, flat, and covered with scrub.

Gœlette islet, lying about  $1\frac{1}{2}$  miles south-westward of South island, is low and flat, with, in 1905, a small clump of coconut trees, 10 feet ( $3^m0$ ) high, on it, also a small sandhill; it may be identified from a 15 distance of from 5 to 6 miles.

Trois Iles, three islets lying on the north-western side of the atoll, are named, respectively, Ile des Déposés, Ile du Milieu, and Ile Lapin. Ile des Déposés, the westernmost and largest, about  $5\frac{1}{2}$  miles west-south-westward of Race point, the western extremity of North island, 20 is inhabited by natives; there are three conspicuous coconut trees in the centre of this islet. Ile du Milieu and Ile Lapin (*Lat.*  $10^{\circ} 08' S.$ , *Long.*  $51^{\circ} 06' E.$ ) are both covered with scrub.

**Wrecks.**—The wreck of the s.s. *Aymestry* lies on the reef, about  $1\frac{1}{2}$  miles westward of Ile des Déposés; it was reported, in 1932, that 25 this wreck had one mast standing and was very conspicuous.

Another wreck, of which only the hull, in 1932, was visible, lies on the reef about  $3\frac{1}{2}$  miles south-westward of Ile des Déposés; the position of this wreck is approximate.

*Chart 2899.*

**Outlying shoal.**—Rajaswaree shoal, over which heavy breakers were reported to have been seen from a vessel of that name, in 1858, but on which no soundings were taken, was considered to lie in about lat.  $11^{\circ} 25' S.$ , long.  $52^{\circ} 02' E.$ , about 90 miles south-eastward of the Farquhar group, but as nothing was seen of it by H.M.S. *Philomel* 35 when searching for it, in 1876, nor by H.M.S. *Cossack* when passing over the assigned position of the shoal, in 1894, nor by any other vessel, it may be conjectured that a tide ripple was mistaken for breakers. Nevertheless, the shoal is still shown on the chart, and a careful look-out should be kept when in this locality. 40

The s.s. *Congella* passed over this reported position, in 1905, no breakers or shoal water were observed, but there were numerous tide-rips.

*Chart 718, plan of Farquhar group.*

**Anchorage.**—**Dangers.**—There is good anchorage on the bank 45 fringing the north-western side of the atoll, westward of North island, except during the cyclone season from December to April, inclusive. The best berth is in depths of 7 fathoms ( $12^m8$ ), sand, with Race point bearing about  $173^{\circ}$  and the northern extremity of North island about  $079^{\circ}$ ; little or no swell is felt at this anchorage, although there may 50 be a heavy sea outside.

Close southward of this anchorage is the entrance to the lagoon or inner harbour; this entrance is narrow and tortuous, with strong tidal streams in it, and should not be used by vessels drawing more

*Charts 2899, 597, 748b.*

*Chart 718, plan of Farquhar group.*

than 10 feet (3<sup>m</sup>0). The least depth in the fairway of this channel is probably 3½ fathoms (6<sup>m</sup>4), but there are numerous coral heads over which there may be less depths.

- 5 Anchorage is charted in depths of from 2 to 3 fathoms (3<sup>m</sup>7 to 5<sup>m</sup>5) in the light southward of the settlement, about 2 cables eastward of the western extremity of Race point. The schooner which visits this group uses this anchorage.

- Tidal streams.**—The tidal stream at the anchorage close northward of the entrance to the inner harbour sets north-eastward during the rising tide and until 3 hours after high water by the shore, attaining a rate at springs of from a quarter of a knot to 1½ knots; for the remaining 3 hours before low water the tidal stream sets westward at a rate of about half a knot or is slack.

- 15 **Directions.**—A vessel coming from eastward should round North point at a distance of one mile, and continue a westerly course until Race point (*Lat.* 10° 07' S., *Long.* 51° 10' E.) bears about 174°, when it should be steered for on that bearing; the depths will decrease rapidly as the anchorage is approached. It is not advisable to approach these islands at night, nor from westward except in clear weather.

Boats proceeding from the anchorage to the settlement on North island should give the north-western side of Race point a good berth, but pass close to its south-western extremity.

- 25 **Boat passage.**—There is a shallow break in the barrier reef at the western extremity of the atoll, forming a boat passage into the lagoon.

*Charts 1881, plans of St. James anchorage and Agalega islands; 2899.*

- AGALEGA ISLANDS.**—**General remarks.**—Agalega islands, which lie about 190 miles southward of Coetivy island, consist of two islands, extending about 12 miles south-eastward, and joined by a ridge of drying sand about a mile long; they are a dependency of Mauritius. North island, about 25 feet (7<sup>m</sup>6) high, was, in 1934, thickly planted with coconut palms near its northern end; South island, 15 feet (4<sup>m</sup>6) high, is nearly covered with coconut and high casuarina trees, which may be seen from a distance of 15 miles. From south-eastward or north-westward these two islands appear as one island; they should not be approached at night on account of the tidal streams, which run strongly and irregularly, also on account of the absence of lights.

*Chart 1881, plans of St. James anchorage and Agalega islands.*

- 40 Agalega islands are fringed by a reef, which is steep-to, and through which there are boat passages.

- A settlement, near which is a flagstaff, is situated on the north-western side of North island, and another, known as Port Sainte Rita, on the north-eastern side of South island; the flagstaff near the settlement on South island consists of a steel framework mast, 126 feet (39<sup>m</sup>4) in height.

- Landing in ship's boats at Port Sainte Rita is dangerous, and the channel through the coastal reef is difficult at low water, but a surf-boat can be obtained. Ship's boats can effect a landing on the north-western side of North island.

A vessel from Mauritius visits these islands periodically.

The chief exports are copra, other coconut products, and guano.

**Local weather.**—See pages 45-46.

*Charts 2899, 597, 748b.*

*Chart 1881, plans of St. James anchorage and Agalega islands.*

**Jetties.—Light.**—A jetty, situated about  $3\frac{1}{2}$  cables south-south-westward of Tappe à Terre, the northern extremity of North island, extends from the coast in a westerly direction, and another jetty exists about  $1\frac{1}{2}$  cables southward of the former. 5

From the north-eastern coast of South island a jetty extends in a north-north-easterly direction; a light is occasionally exhibited from the inner end of this jetty.

*Chart 2899.*

**Outlying banks.**—A bank, with depths of about 15 fathoms ( $27^m4$ ) 10 over it, is reported to lie about 15 miles westward of the northern island (*Lat.*  $10^{\circ} 23' S.$ , *Long.*  $56^{\circ} 36' E.$ ). It is reported that in December, January, and February, the fishermen of the islands resort to this bank, from which they can just see land.

A bank, with a depth of 13 fathoms ( $23^m8$ ) over it, was reported, in 15 1943, to lie about 50 miles eastward of the southern Agalega island.

*Chart 1881, plans of St. James anchorage and Agalega islands.*

**Pilots.**—The coxswain of the surf-boat acts as pilot if required, but may not be very competent.

**Anchorage.—Beacons.—Directions.**—St. James anchorage, on 20 the north-western side of North island, affords anchorage to small vessels, with shelter from the south-east monsoon, in depths of from 5 to 10 fathoms ( $9^m1$  to  $18^m3$ ), about  $4\frac{1}{2}$  cables south-westward of Tappe à Terre.

Two concrete posts, painted white, the rear of which is the taller, 25 situated about  $3\frac{1}{2}$  cables south-south-westward of Tappe à Terre, when in line, bearing  $098^{\circ}$ , lead towards St. James anchorage.

Francis bay, about  $1\frac{1}{2}$  miles southward of St. James anchorage, affords anchorage to vessels with local knowledge.

Anchorage can be obtained in Little Mapou bay, on the western side 30 of South island, in depths of from 17 to 20 fathoms ( $31^m1$  to  $36^m6$ ), about 3 or 4 cables from the coastal reef.

H.M.S. *Frolic* obtained anchorage, in 1857, on a ledge on the eastern side of South island, in depths of 10 fathoms ( $18^m3$ ), coral and large rocks, about 2 cables from the coastal reef. The steepness of the 35 coastal reef renders it difficult to find an anchorage.

There is anchorage for vessels with local knowledge in depths of from 18 to 20 fathoms ( $32^m9$  to  $36^m6$ ), sand and gravel, off Port Sainte Rita.

A vessel wishing to anchor here should display a signal, which will 40 be answered by a flag displayed from the flagstaff; a boat will then proceed to the incoming vessel, and indicate the anchorage. Vessels should be ready to weigh during strong easterly winds, as a heavy swell sets in on such occasions.

**Tidal streams.**—At the anchorage used by H.M.S. *Frolic* (see 45 above) the tidal streams attained a rate of from one to 3 knots, the ebb stream at its commencement attaining the maximum rate.

The *Griffon* in June, 1888, reported the tides to be irregular, and that correct information was not obtainable.

A strong north-easterly set was experienced by the *Lapwing*, in 50 August, 1892, whilst lying off Port Sainte Rita.

In 1942, it was reported that the tidal streams usually set north-westward on both sides of the Agalega islands, attaining a rate of 3 knots and sometimes more. Off Port Sainte Rita there are eddies

*Charts. 2899, 748b.*

*Chart 1881; plans of St. James anchorage and Agalega islands.*

which may set a vessel on to the reef ; at St. James anchorage the tidal streams are more regular, usually setting north-westward and slightly offshore, but setting south-eastward for about 2 hours during the rising tide.

*Chart 2899.*

**SAYA DE MALHA BANK.—General remarks.**—This extensive bank, as now defined, shows a distinct division between its northern and southern parts ; the southern bank being by far the larger. The two banks are included between lats.  $8^{\circ} 16' S.$  and  $11^{\circ} 46' S.$  ; and between longs.  $59^{\circ} 37' E.$  and  $62^{\circ} 22' E.$  The banks were partially surveyed by Commander Aldrich, H.M.S. *Fawn*, in 1881, and this survey remains the principal source of information.

The bottom appears to be generally of coral when in depths of less than 33 fathoms ( $60^m4$ ), and in greater depths, of fine sand. H.M.S. *Fawn* anchored on the southern bank, in depths of 14 fathoms ( $25^m6$ ), in lat.  $9^{\circ} 53' S.$ , long.  $60^{\circ} 51' E.$ , riding easily with 100 fathoms ( $182^m9$ ) of cable, though there was occasionally a choppy sea ; also, on the northern bank, in lat.  $8^{\circ} 25' S.$ , long.  $60^{\circ} 10' E.$ , in depths of 11 fathoms ( $20^m1$ ).

The northern bank is steep-to, the eastern edge, with depths of from 6 to 12 fathoms ( $11^m0$  to  $21^m9$ ) and at one spot in about lat.  $8^{\circ} 45' S.$ , long.  $60^{\circ} 12' E.$  of only 4 fathoms ( $7^m3$ ) over it, rises abruptly from the bed of the ocean. About 3 miles south-south-eastward from the supposed position of the 4-fathom ( $7^m3$ ) spot the Austrian ship *Fasana*, in 1890, took many soundings on a bank of coral  $3\frac{1}{2}$  miles long north-eastward and south-westward and 2 miles wide, on which the least depth found was 8 fathoms ( $14^m6$ ). From the eastern edge, the bank gradually deepens near the western side to depths of 20 and 30 fathoms ( $36^m6$  and  $54^m9$ ) and then falls suddenly into great depths ; bottom was not obtained within 2 miles of the western edge at depths of 130 and 200 fathoms ( $237^m7$  and  $365^m8$ ). About 6 miles eastward of the bank, bottom was not reached at a depth of 500 fathoms ( $914^m4$ ). The apparent northern end, with depths of 12 fathoms ( $21^m9$ ) over it, lies in lat.  $8^{\circ} 18' S.$ , long.  $60^{\circ} 06' E.$  ; about 2 miles north-eastward of this position bottom was not reached at a depth of 225 fathoms ( $411^m5$ ).

A depth of 5 fathoms ( $9^m1$ ) was found near the eastern edge of the northern bank in lat.  $9^{\circ} 12' S.$ , long.  $60^{\circ} 21' E.$ , with depths of from 6 to 10 fathoms ( $11^m0$  to  $18^m3$ ) for 16 miles south-westward, dropping very suddenly to depths of over 220 fathoms ( $402^m3$ ). North-eastward of the 5-fathom ( $9^m1$ ) patch, for a distance of 6 miles to the edge of the bank, there are general depths of from 6 to 8 fathoms ( $11^m0$  to  $14^m6$ ), with depths of 160 fathoms ( $292^m6$ ) just off the edge of the bank, and no bottom at a depth of 500 fathoms ( $914^m4$ ) about 13 miles farther eastward. It is quite probable that shoaler water than yet found may exist on this bank.

The southern bank, or main body of the Saya de Malha bank, is much larger than the northern, and its charted position and depths chiefly depend on the survey of Captain Moresby in 1837–8. It is separated from the northern bank by a deep channel some 15 or 20 miles wide. The least depths lie near the northern and the eastern edges, from which the depths increase to from 25 to 90 fathoms ( $45^m7$

*Charts 2899, 748b.*

*Chart 2899.*

to 164<sup>m</sup>6) towards the south-western side, and thence to great depths. Over the northern part of this bank, in lat. 9° 58' S., long. 61° 28' E., are depths of 8 or 9 fathoms (14<sup>m</sup>6 or 16<sup>m</sup>5) over a small area ; nowhere southward of this are depths of less than 10 fathoms (18<sup>m</sup>3) known to exist, though in the neighbourhood of lat. 10° 50' S., long. 62° E., an unauthenticated depth of 4 fathoms (7<sup>m</sup>3) has been reported. At the northern edge, however, in about lat. 9° 45' S., long. 61° 25' E., M. Poydenot, of the Messageries steam vessel *Armand Behic*, in 1892, saw the bottom and sounded in 4½, 6, and 6½ fathoms (8<sup>m</sup>7, 11<sup>m</sup>0, and 11<sup>m</sup>9). So far as known this is the shoalest part of the southern bank.

Depths of 13 fathoms (23<sup>m</sup>8) were obtained, in 1924, by the British s.s. *Janus*, about 4 miles northward of the northern extremity of the southern bank. This shoal has not been examined and less depths may exist.

A plentiful supply of large fish may be caught at anchor on the bank, but the fishermen from Mauritius report that several well-known descriptions of fish, eatable elsewhere, are here found to be very poisonous.

**Caution.**—On this vast bank there may be shoals yet undiscovered, therefore great caution is requisite, and a good lookout should be kept when passing over any part of it. H.M.S. *Cornwallis*, in 1806, and the H.E.I. Company's ship *Northumberland*, in 1811, found depths of 7 fathoms (12<sup>m</sup>8), and the H.E.I. Company's ship *Preston*, in 1810, of 6½ fathoms (11<sup>m</sup>9) on the eastern edge, and it has been confidently reported many years ago that there are coral patches at the south-eastern extremity on which a vessel might touch ; in this quarter, the French schooner *Eliza* reported, in 1816, a depth of 4 fathoms (7<sup>m</sup>3).

**Current.**—From observations taken when at anchor, and during surveying operations, the mean direction of the current was found to be a little southward of west, with an average rate of one knot, but during the cyclone season, December to April, an easterly current has been experienced. In the many deeper channels between the shoaler parts of the bank, the current is variable, and runs with increased strength ; the weakest current is over the shallowest parts.

North-westward of the northern bank, in lat. 7° 45' S., long. 59° 40' E., heavy tide-rips and one overfall were observed, probably caused by the meeting of the currents from the opposite sides of the bank ; no bottom was obtained at depths of 230, 180, and 214 fathoms (420<sup>m</sup>6, 329<sup>m</sup>2, and 391<sup>m</sup>4).

In the deep channel between Saya de Malha bank and Nazareth bank, about 100 miles southward, a westerly current has been known to set through it at a rate of from 25 to 50 miles a day.

*Chart 748b.*



## CHAPTER IV

## CHAGOS ARCHIPELAGO

*Chart 3.*

**CHAGOS ARCHIPELAGO.—General remarks.**—The Chagos archipelago, consisting of numerous islands and coral reefs, lies between the parallels of 4° 44' S. and 7° 41' S. and the meridians of 70° 47' E. and 72° 47' E. It is a dependency of Mauritius.

The most remarkable feature in this archipelago is the general atoll character of the islands, reefs, and banks.

It has been said that the deeper parts of the banks may be crossed when there is not much swell but, considering the uncertainty respecting the depths of partially examined areas and the changeable character of coral reefs, it is best to avoid them, especially as communication with each of the islands may be effected without crossing a bank.

**Currents.—Tidal streams.**—For ocean currents in the neighbourhood of the Chagos archipelago, *see* pages 12 and 14.

The set of the current through the archipelago varies with the wind. From the middle of December until the middle of April the set is eastward and from the beginning of June to the end of September westward, varying occasionally a little northward or southward of these directions.

During the latter half of April and part of May, as also during November and the first half of December, both winds and currents are variable; the greatest rate of current observed, during the survey of 1837, was 2 knots over Great Chagos bank.

During the surveying operations of H.M.S. *Sealark* from May to July, 1905, the current off the banks was found to be, practically, always setting eastward and south-eastward, that is to say, against the trade wind, which blows here with considerable strength. This resulted in a turbulent sea, which increased when in proximity to the eastern side of Great Chagos bank.

Regular tidal streams are experienced on the banks and near the islands of the archipelago; the flood stream sets east-south-eastward and the ebb west-north-westward. In some parts, the current and tidal stream run obliquely towards each other or are directly opposed, occasioning variations both in direction and rate; in strong breezes this causes a confused swell which, on the shoaler parts of the banks,

*Charts 2899, 748b.*

**Chart 3.**

breaks in heavy rollers, the waves rising to heights of from 15 to 18 feet (4<sup>m</sup>6 to 5<sup>m</sup>5).

**Local weather.**—See pages 146-147.

**ISLANDS AND BANKS IN NORTHERN PART.—Speakers bank.**—Speakers bank, the northernmost of the Chagos archipelago, extends about 24 miles in a north-north-easterly and south-south-westerly direction, and is steep-to; the bottom consists of coral, sand, and rocks and sand.

The depths at the edges of the bank are, in general, from 6 to 10 7 fathoms (11<sup>m</sup>0 to 12<sup>m</sup>8), increasing towards the centre. Near its south-western edge there are depths of only 4 fathoms (7<sup>m</sup>3); this part of the bank should be avoided, as the sea breaks heavily over it during the south-east monsoon.

**Chart 2899.**

A bank, with a depth of 30 fathoms (54<sup>m</sup>9) over it, was reported, in 1945, to lie about 25 miles north-eastward of the northern extremity of Speakers bank; this bank has not been examined.

**Chart 3.**

**Blenheim reef.—Anchorage.**—Blenheim reef (*Lat.* 5° 13' S., 20 Long. 72° 28' E.), the northern extremity of which is situated about 9 miles east-south-eastward of the south-eastern extremity of Speakers bank, extends 5½ miles southward, and is steep-to. A narrow strip which, in 1837, was generally covered at high water except for some large blocks of coral and sand-stone on the eastern side, enclosed a lagoon on all sides except at the southern end, where anchorage could be found in the opening in depths of from 6 to 7 fathoms (11<sup>m</sup>0 to 12<sup>m</sup>8). The lagoon is encumbered with rocks.

**Charts 4, plan of Salomon islands; 3.**

**Salomon islands.**—This group of islands and islets lies about 11 miles west-south-westward of Blenheim reef and stands on an atoll reef, which encloses a lagoon; the islands are all flat and covered with coconut trees, from 60 to 80 feet (18<sup>m</sup>3 to 24<sup>m</sup>4) high.

**Chart 4, plan of Salomon islands.**

This atoll, in 1940, belonged to a company in Mauritius. The inhabitants, including a white manager, lived on Ile Boddam, at the south-western end of the atoll; the settlement was on the eastern side of this island, where a small pier, with depths of 4 feet (1<sup>m</sup>2) alongside, projected.

Salomon islands are reported to be the most fertile in the Chagos archipelago; copra is the principal product.

A vessel from Mauritius visits the atoll periodically.

**Chart 4, plans of Entrance to Lagoon, Salomon islands, and Salomon islands.**

**Lagoon.—Entrance.**—The entrance to the lagoon is through a pass on the north-western side of the atoll. A least depth of 3½ fathoms (5<sup>m</sup>9) may be carried through it, but the bar is impassable during the north-west monsoon.

Within the lagoon there are numerous coral rocks, with deep water between them.

**Anchorage.—Directions.**—During the south-east monsoon anchorage may be found outside the entrance to the lagoon in depths of 10 fathoms (18<sup>m</sup>3). A vessel making this anchorage should steer for

*Charts 3, 2899, 748b.*

E\*

*Chart 4, plans of Entrance to Lagoon, Salomon islands, and Salomon islands.*

the south-western extremity of Ile Takamaka, which island lies at the eastern extremity of the atoll, bearing  $137^{\circ}$ , and anchor when the south-eastern extremity of Ile de la Passe, lying on the north-eastern side of the entrance, bears  $085^{\circ}$ . This anchorage was constantly used, in 1905, by H.M.S. *Sealark*.

There is excellent anchorage inside the lagoon in depths of 12 fathoms (21<sup>m</sup>9) off Ile Takamaka, with the northern extremity of that island bearing  $059^{\circ}$  and the northern extremity of Ile Fouquet, lying close south-south-westward of Ile Takamaka, bearing  $126^{\circ}$ .

Small vessels with local knowledge visiting the atoll find anchorage off the settlement on the eastern side of Ile Boddam (Lat.  $5^{\circ} 22' S.$ , Long.  $72^{\circ} 13' E.$ ).

No directions can be given for reaching these last anchorages, and it is best to con from the masthead.

**Tidal streams.**—The tidal streams at the anchorage outside the lagoon entrance set from north-north-east to east at a rate of about half a knot while the tide is rising, and from north-west to west, whilst it is falling, at a rate of from half a knot to  $1\frac{1}{4}$  knots. There is no period of slack water; each stream is at its greatest strength at the beginning of its course, gradually slackening.

The stream on the bar runs with considerable strength, sometimes attaining a rate of  $2\frac{1}{2}$  knots on the rising tide shortly after springs.

The tidal streams are not felt at all at the anchorage off Ile Takamaka.

*Charts 4, plan of Peros Banhos; 3.*

**Peros Banhos.**—This group of islands and islets, the largest of the Chagos archipelago, lies about 14 miles westward of Salomon islands, and is atoll-shaped; the islands are low-lying, the greatest elevation being about 11 feet (3<sup>m</sup>4), and are visible from the deck of a vessel from a distance of about 15 miles. All the islands, in 1933, except Coin du Mire, lying at the southern end of the atoll, were planted with coconut palms; the tops of the palms on Ile Diamant, at the north-western end of the atoll, and on Ile du Coin, at the south-western end, are over 100 feet (30<sup>m</sup>5) high; those on Grande Ile bois mangue, in the middle of the northern side of the atoll, are also tall, and are conspicuous; Coin du Mire is a flat-topped rocky islet with grassy patches. The seaward sides of the islands of this group are mostly formed of rock, mainly coral boulders, and their inner sides are sandy, with bare spits extending from either end; the land is subject to great alterations, being washed away in one monsoon and piled up in the other.

*Chart 4, plan of Peros Banhos.*

The gap between Ile Diamant and the Moresby islands,  $2\frac{1}{2}$  miles eastward, is conspicuous from northward and north-westward.

The outer edges of the reefs fringing the Peros Banhos group are steep-to.

The group is a dependency of Mauritius; the principal settlement is on Ile du Coin.

Landing is difficult on all the islets, except at the settlement on Ile du Coin, both on account of the swell and because of the fringing reefs; in most cases it is not possible except near high water.

Copra is the principal industry, a small amount of oil being produced. A large number of coconuts is exported annually to Mauritius, also tortoise-shell. A small quantity of guano is also exported.

*Charts 3, 2899, 748b.*

*Chart 4, plan of Peros Banhos.*

**Off-lying danger.**—Benares shoal, a coral shoal with a least depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ) over it, the south-eastern extremity of which is situated  $4\frac{1}{2}$  miles westward of Ile Diamant (*Lat.*  $5^{\circ} 15' S.$ , *Long.*  $71^{\circ} 46' E.$ ), extends  $1\frac{1}{2}$  miles in a west-north-westerly direction; it is steep-to, and the sea seldom breaks over it.

**Lagoon.—Dangers.**—The lagoon is encumbered with numerous coral heads, mostly lying in the south-western part; the group of shoals lying about 3 miles north-eastward of the settlement on Ile du Coin is called Danger shoals, and is partly awash.

A shoal, with a depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) over it, lies about  $1\frac{1}{2}$  miles north-eastward of the settlement.

With the exception of Danger shoals none of the shoals in the lagoon uncovers, though the sea breaks over some of them in bad weather; in fine weather they can be easily seen from the masthead.

**Anchorage.**—The atoll being so open, and having large entrances, possesses no completely sheltered anchorage. H.M.S. *Sealark*, in 1905, anchored in eight different positions round the lagoon, during the south-east monsoon, and found it impossible to escape both swell and tidal stream. The quietest anchorage is off Ile Fouquet, on the western side of the southern entrance to the lagoon.

The usual anchorage during the south-east monsoon is off the eastern side of the northern end of Ile du Coin in depths of 12 fathoms ( $21^m9$ ), with the northern extremity of that island bearing  $274^{\circ}$  and the eastern extremity  $128^{\circ}$ ; this position is fairly well sheltered from the south-east monsoon and is reported to be so also from the north-west monsoon.

During the north-west monsoon the anchorage off Ile Diamant is to be preferred; the best berth is, in depths of from 14 to 17 fathoms ( $25^m6$  to  $31^m1$ ), with the huts on that island, bearing  $310^{\circ}$ , distant about 5 cables.

**Tidal streams.**—At the anchorage off Ile du Coin the stream sets north-westward while the tide is rising, attaining a maximum rate of about half a knot; it is scarcely felt during the falling tide. At the anchorage off Ile Fouquet the streams are barely appreciable with either tide. At the remaining entrances to the lagoon the tidal stream sets from north-north-west to west, while the tide is falling, at a rate of from three-quarters to one knot, or more, at springs; the other stream is less strong and sets from south-by-east to east-by-south at a rate of about half a knot, whilst the tide is rising. These observations were made during the south-east monsoon, and the result may be very different in other seasons.

**Boat passages.**—There is a boat passage through the reef, leading to the south-eastern coast of Ile Diamant.

There is also a boat passage through the reef fringing the north-eastern side of Ile du Coin; the south-eastern side of the entrance to this passage was marked, in 1940, by a small beacon.

These two passages are only available for boats when the tide is above mean level.

**Entrance channels.—Directions.**—The main entrances to the lagoon have moderate depths and appear to be free from dangers, but tide-rips may be experienced in them.

There is sometimes a slightly confused sea over the bar between Ile Fouquet (*Lat.*  $5^{\circ} 27' S.$ , *Long.*  $71^{\circ} 49' E.$ ) and Ile Vache Marine,

*Chart 4, plan of Peros Banhos.*

2½ miles north-north-eastward, due to the outgoing tidal stream setting against wind and swell; the bottom can be seen in the shoaler parts of this channel. In May, 1940, a vessel drawing 21½ feet (6<sup>m</sup>5) entered this channel with a conspicuous red-roofed building on the north-eastern side of Ile du Coin, close to the south-western end of the boat passage, bearing 269°, and altered course towards the northern extremity of Ile Anglaise, which lies close northward of the north-western end of Ile du Coin, when it bore 286°. These courses lead through the fairway towards the anchorage off the settlement. The passage eastward and northward of Ile Vache Marine is not recommended, nor should a course be taken northward of that indicated above, on account of various dangers in that locality.

The other deep entrances to the lagoon are rarely used, as that described above leads most conveniently and directly to the settlement.

If approaching from north-westward during the north-west monsoon a vessel may enter the lagoon either by Moresby channel, westward of the Moresby islands, or through Passe de l'Ile Poule, on the western side of the atoll.

*Chart 3.*

**Victory bank.**—Victory bank lies about midway between the Salomon islands and Great Chagos bank, about 20 miles southward; it rises steeply from great depths to, in 1837, within 3 fathoms (5<sup>m</sup>5), or perhaps less, of the surface round the edge, while there are depths of from 7 to 20 fathoms (12<sup>m</sup>8 to 36<sup>m</sup>6) over its interior.

**GREAT CHAGOS BANK.—General remarks.**—Great Chagos bank extends about 60 miles in a northerly and southerly direction and about 90 miles in an easterly and westerly direction; it is steep-to on all sides.

A narrow coral ridge round the edges of Great Chagos bank has a least depth of 4 fathoms (7<sup>m</sup>3) over it; within the edges the depths increase to 48 fathoms (87<sup>m</sup>8), but there are, however, numerous isolated coral heads with least depths of 5 fathoms (9<sup>m</sup>1). In 1895, the schooner *Earnest* reported having sounded on a shoal with a depth of 3 feet (0<sup>m</sup>9) over it, in lat. 6° 17' S., long. 72° 15' E.; the position of this shoal is approximate.

Soft clay will be found in some places on this bank affording good anchorage.

**Caution.**—Vessels should not cross Great Chagos bank when there is much swell on, and only in case of necessity; if obliged to cross it, the passage should be made, if possible, during the daytime, with a good look-out from the masthead, and the sun astern.

**Islands and dangers.—Anchorages.**—Nelsons island (Lat. 5° 41' S., Long. 72° 20' E.), lying about the middle of the northern edge of Great Chagos bank, was, in 1934, covered with low scrub and had a few coconut palms, from about 20 to 30 feet (6<sup>m</sup>1 to 9<sup>m</sup>1) high, on it; it is uninhabited, and is only occasionally visited, for sea birds' eggs, by natives from the adjoining atolls. Large numbers of birds were reported, in 1934, to nest here. Landing might be effected in a small bay on the sandy northern coast of this island, near its north-eastern extremity; a bank, with depths of less than 3 fathoms (5<sup>m</sup>5), extends as much as 1½ cables from its northern coast. Nelsons island was reported, in 1934, to lie about 1½ miles westward of its charted position.

*Charts 3, 2899, 748b.*

*Chart 3.*

A deep channel close eastward of Nelsons island leads to an anchorage in depths of from 16 to 17 fathoms (29<sup>m</sup>3 to 31<sup>m</sup>1) on this bank.

The Three Brothers, viz., North Brother, Middle Brother, and South Brother, lie near the western edge of Great Chagos bank, about 53 miles west-south-westward of Nelsons island; these islets are covered with tall coconut palms. Reefs fringe all three islets, and a bank, with a least depth of 4 fathoms (7<sup>m</sup>3) over it, extends about 5 miles east-south-eastward of South Brother. The surf renders landing difficult, but boats can approach from northward and effect a landing on the eastern coast of Middle Brother, which is sheltered by the reef. A rocky islet lies on the south-eastern side of the channel between Middle Brother and South Brother.

Close south-westward of Three Brothers a break in the coral ridge forms a deep channel, with a least width of 2½ miles; some shoals, with a least depth of 3 fathoms (5<sup>m</sup>5) over them, lie on the southern side of this channel.

Eagle islands, which are uninhabited, lie 11 miles west-south-westward of North Brother. The northern island is nearly covered with tall coconut palms, and at its south-western end are some trees of a different kind; a reef, over which the sea breaks, extends about 5 cables south-westward of the south-western end of this island. The southern islet is low and covered with trees.

Anchorage may be obtained between these two islands in depths of from 4 to 9 fathoms (7<sup>m</sup>3 to 16<sup>m</sup>5), sand and coral, but care must be taken not to get off the bank of soundings.

Danger island, lying on the western extremity of Great Chagos bank, about 8½ miles south-south-westward of the southern Eagle island, is low, and covered with palm trees about 40 feet (12<sup>m</sup>2) high. The sea breaks heavily round its coast and, a reef, over parts of which the sea generally breaks, extends 3 miles south-south-eastward of this island.

Good anchorage in depths of 17 fathoms (31<sup>m</sup>1) may be found eastward of Danger island.

About 7½ miles south-eastward of Danger island there is another break in the coral ridge, forming a deep channel.

**Off-lying islands and dangers.—Anchorage.—Tidal streams.**

—Discoloured water was reported, in 1940, in a position about 6 miles south-westward of Danger island (Lat. 6° 23' S., Long. 71° 16' E.).

*Charts 4, plan of Six islands; 3.*

Egmont or Six islands, about 15 miles south-south-eastward of Danger island, lie on the southern and western sides of an atoll reef, over which the sea breaks, and which encloses a lagoon encumbered with numerous coral rocks, over many of which the sea breaks; the reef is almost steep-to. This group of islands is planted with coconut trees, and is very productive.

*Chart 4, plan of Six islands.*

There was a coconut oil factory on Ile Sudest, the south-eastern island of the group, in 1905, and a white manager and some labourers lived here.

A vessel from Mauritius visits this atoll periodically, and proceeds to a small pier facing the settlement.

The only entrance to the lagoon is a broad, but shallow, channel on the northern side of the atoll.

*Charts 2899, 748b.*

*Chart 4, plan of Six islands.*

Anchorage may be obtained just outside the entrance to the lagoon, in depths of 6 fathoms (11<sup>m</sup>0), with the northern extremity of Ile Sudest bearing 131° and the eastern extremity of Ile Lubine, about 5 2 miles west-north-westward of the western extremity of Ile Sudest, bearing 183°; H.M.S. *Sealark* anchored here on two occasions, in 1905, during the south-east monsoon.

At this anchorage the tidal streams are but little felt; the set is north-west-by-northward with a maximum rate of half a knot, during 10 the falling tide; when the tide is rising the stream is not appreciable. *Charts 4, plan of Six islands; 3.*

A shoal, with a depth of 2 fathoms (3<sup>m</sup>7) over it, the position of which is doubtful, was reported, in 1932, to lie about 2 miles south-westward of Ile Lubine.

15 *Chart 3.*

Cauvin bank was reported, in 1916, to lie about 5½ miles southward of the southern extremity of Great Chagos bank and 57 miles eastward of Ile Sudest; the least depth found over this bank was 7 fathoms (12<sup>m</sup>8), but there may be less water.

20 **BANKS SOUTHWARD OF EGMONT ISLANDS.**—Pitt bank, the northern extremity of which is situated 12 miles south-westward of Egmont islands, extends about 30 miles south-south-eastward and has a greatest breadth of about 25 miles; it is steep-to on all sides. The least depth found, in 1837, was 4 fathoms (7<sup>m</sup>3) on the eastern 25 side of the bank; depths of 6 or 7 fathoms (11<sup>m</sup>0 or 12<sup>m</sup>8) were frequently found near the edges on the north-eastern and western sides of the bank, but it appeared to be deeper on the south-western and southern sides. Vessels are advised not to pass over this bank, especially at night.

30 Ganges bank, the northern extremity of which lies 12½ miles south-westward of the south-western side of Pitt bank, extends 3½ miles south-south-eastward and has a greatest breadth of 3 miles; it is steep-to. The least depth found over this bank, in 1837, was 8 fathoms (14<sup>m</sup>6), but there may be less water.

35 Centurion bank (*Lat. 7° 40' S., Long. 70° 49' E.*), the northern extremity of which is situated 21½ miles south-westward of Ganges bank, extends 4½ miles south-eastward with a greatest breadth of about 2 miles and is steep-to; a least depth of 6 fathoms (11<sup>m</sup>0) was found over it, in 1837, but heavy rollers have been observed to 40 break over its north-eastern edge.

The tidal streams over Centurion bank were observed in July, 1905, to be setting westward and north-westward with a falling tide, at a rate of about a quarter of a knot.

The channels between Pitt, Ganges, and Centurion banks are deep 45 and free from dangers.

Wight bank was reported, in 1886, by the British s.s. *Delhi* to lie about 10 miles south-south-eastward of the south-eastern extremity of Pitt bank, and to have a least depth of 4½ fathoms (8<sup>m</sup>7), coral, over it; as it is probable that less depths exist mariners should navigate 50 in this vicinity with caution.

Midway between Wight bank and the southern, charted, position of Pitt bank is another bank, with a least depth of 7 fathoms (12<sup>m</sup>8) over it. H.M.S. *Sealark* anchored on this bank in July, 1905, in

*Charts 2899, 748b.*

*Chart 3.*

depths of 8 fathoms (14<sup>m</sup>6), her position, well established, being latitude 7° 20' 2" S., longitude 71° 28' E.; the weather was remarkably fine, but sudden swells were rising and crossing the bank in all directions, no breakers were observed, but probably there would be many in heavy weather. No current was experienced during the four hours she was on the bank, a period during which the tide was rising at Diego Garcia, about 51 miles eastward. 5

*Charts 920, 3.*

**DIEGO GARCIA.**—General remarks.—Diego Garcia, a dependency of Mauritius about 70 miles east-south-eastward of Egmont islands and the southernmost island of the Chagos archipelago, lies on an atoll; this atoll reef is steep-to on its seaward sides and protects the island. The land is subject to alteration, being at times washed away at one part and raised at another; the general elevation is from 3 to 5 feet (0<sup>m</sup>9 to 1<sup>m</sup>5); the outer part of the island is the highest in consequence of the pile of coral boulders thrown up by the sea. The base of the island appears to be formed of coral rock. 10 15

*Chart 920.*

The main island, with the exception of 6 acres of land near Observatory point, 3 cables southward of Barton point, the north-eastern entrance point of the lagoon, is the property of a private company. West, Middle, and East islets, lying at the entrance to the lagoon, and the 6 acres above mentioned, are the property of the Crown, but all are leased to the same company. 20 25

The lagoon is infested by sharks, rendering it dangerous to bathe in deep water.

There are establishments at Point Marianne (Lat. 7° 19' S., Long. 72° 26' E.), 4½ miles south-eastward of Eclipse point, the south-western entrance point of the lagoon, and at East point, 7¼ miles south-eastward of Barton point; these establishments consist of houses, huts, oil-mills, and storehouses. 30

The manager of the company resides at East point and is the magistrate of the island. A magistrate from Mauritius visits the island once a year. 35

The manager and three subordinate officials, with their families, are the only white inhabitants.

In 1933, the population was 373. The language spoken generally is a French-creole *patois*.

A few fowls and ducks may be purchased, also bread, vegetables, and fruit in small quantities; fish can be obtained by the seine inside the lagoon. 40

The exports to Mauritius consist of coconut oil, coconuts, copra, guano, and salted fish.

There is periodical communication with Mauritius. 45

**Meteorological tables.**—See page 55.

**Approach.**—**Aspect.**—From a short distance Diego Garcia appears to be covered with vegetation, principally of bright green colour, fringed by a white sandy beach. The principal trees are the coconut, the tops of which are, in some places, 110 feet (33<sup>m</sup>5) high; there are several clumps of casuarinas on both sides of the island. Though the land is so low, the dense covering of trees is visible from the deck of a vessel from some distance in clear weather. 50

*Charts 3, 2899, 7486.*



*Chart 920.*

Eclipse point is thickly covered with palms to the water's edge and is easily identified ; Barton point is low, covered with short scrub, and has a clump of dwarf palms just inside the point, not easily seen until  
5 fairly close.

West, Middle, and East islets, lying on reefs in the entrance to the lagoon, may be clearly distinguished from a distance of about 5 miles.

Point Marianne is very conspicuous from northward on account of its white beach, dark trees, and buildings ; it forms a good landmark  
10 to approach the island. East point, which may be identified by the trend of the land and the buildings on it, is conspicuous when bearing more than  $170^\circ$  ; about  $1\frac{1}{2}$  miles north-north-eastward of East point is a conspicuous clump of trees, known as Minni Minni knob, and about 3 miles southward of the point are several conspicuous clumps of tall  
15 trees.

**Tidal streams.**—At springs the ebb stream sets north-north-westward out of the lagoon at a rate of over 2 knots and at a greater rate over the bar at the entrance ; from the entrance the flood stream sets about south-south-eastward up the lagoon. In 1933, H.M.S. *Hawkins*  
20 reported that scarcely any tidal stream was perceptible at Minni Minni anchorage although near springs.

**Islets.**—West islet (*Lat.  $7^\circ 15' S.$ , Long.  $72^\circ 23' E.$* ), 15 feet ( $4^m6$ ) high, lying on the atoll reef, about 6 cables north-north-eastward of Eclipse point, has a conspicuous clump of palms on its south-western  
25 end, and a bank, with depths of less than 5 fathoms ( $9^m1$ ) over it, extends about 2 cables north-north-eastward of it.

Spur reef, lying in the centre of the entrance to the lagoon, is about one mile in extent ; the north-western side of this reef, over which the sea always breaks, dries 3 feet ( $0^m9$ ). Numerous rocks and shoals lie  
30 within a distance of  $1\frac{1}{2}$  miles south-eastward and one mile southward of the south-eastern and southern extremities, respectively, of this reef.

The passage between West islet and Spur reef is called Main pass.

Middle islet, lying a short distance within the north-eastern end of Spur reef, had on it, in 1942, a conspicuous clump of trees, the tops  
35 of which were 46 feet ( $14^m0$ ) high. Landing can be effected on the southern side of this islet when the state of the tide permits.

East islet,  $3\frac{1}{2}$  cables eastward of Middle islet, lies on a detached reef, which dries, and extends from about half a cable to one cable from the islet ; there is an opening in the reef at its south-western end. The  
40 western part of East islet consists of sand piled up on the reef, and on it is a clump of trees, the tops of which are 60 feet ( $18^m3$ ) high ; the even surface of the remainder of the islet is about 4 feet ( $1^m2$ ) high and is covered by low scrub. The strong tidal streams cause considerable erosion to the eastern end of this islet.

A bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, extends  
45 about  $2\frac{1}{2}$  cables east-south-eastward and southward of East islet, and a 3-fathom ( $5^m5$ ) patch lies  $2\frac{1}{2}$  cables eastward of the eastern extremity of this islet.

**Entrance channels.**—Main pass, the westernmost of the three  
50 passes, is the recommended channel, with a least depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ) in the fairway.

Middle pass, between Middle and East islets, is narrow and intricate at its south-eastern end, and would require to be marked to render it navigable for a vessel drawing 18 feet ( $5^m5$ ).

*Charts 3, 2899, 748b.*

*Chart 920.*

Barton pass, between East islet and Barton point, is encumbered with shoals, and is only available for small vessels with local knowledge; a least depth of  $3\frac{1}{2}$  fathoms ( $5^m9$ ) can be carried through the fairway of this channel. The atoll reef extends 3 cables north-westward of Barton point, and a bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, extends 2 cables farther west-north-westward and  $3\frac{3}{4}$  cables west-south-westward of this part of the atoll reef; the bank on the north-western side of Barton pass, and the 3-fathom ( $5^m5$ ) patch  $2\frac{1}{2}$  cables eastward of the eastern extremity of East islet, were described above. A shoal, with a depth of 16 feet ( $4^m9$ ), lies in mid-channel 7 cables westward of Barton point.

**Dangers.—Beacons.—Buoys.**—Numerous shoals, with a least depth of one fathom ( $1^m8$ ) over them, lie within about 2 miles southward of East islet (*Lat.  $7^\circ 13'$  S., Long.  $72^\circ 25'$  E.*).

In Eclipse bay, on the western side of the lagoon, just within its entrance, are several shoals, the positions and depths over which can best be seen on the chart; one of them, a shoal, with a depth of  $2\frac{3}{4}$  fathoms ( $5^m0$ ), lying  $7\frac{1}{2}$  cables south-south-eastward of Eclipse point, is marked on its north-eastern side by a can buoy, painted black, and surmounted by a cylinder, painted black and white, known as Cater beacon.

A white beacon stands on the coast about  $1\frac{3}{4}$  miles southward of Eclipse point.

A pair of leading beacons has been established on the western side of the lagoon; the front beacon, painted white, 20 feet ( $6^m1$ ) in height, surmounted by a yellow triangle, stands on the reef about  $9\frac{1}{2}$  cables north-north-westward of Point Marianne, and the rear beacon, painted black, 24 feet ( $7^m3$ ) in height, surmounted by a yellow square, stands on the ruins of a pier close off Point Marianne; this latter beacon was reported, in 1945, to be in ruins.

On either side of the line of leading beacons, for a distance of about 2 miles within the entrance to Main pass, are several shoals, with a least depth of  $4\frac{1}{2}$  fathoms ( $7^m8$ ) over them, the positions of which can best be seen on the chart.

A shoal, with a depth of  $4\frac{1}{2}$  fathoms ( $8^m2$ ) over it, lies in the fairway about  $1\frac{1}{2}$  miles north-north-westward of the front leading beacon; Jennifer shoal, with a depth of 5 fathoms ( $9^m1$ ), lies near the centre of the lagoon, about  $2\frac{1}{2}$  miles northward of Point Marianne.

Parry patch, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m1$ ) over it, lies in the entrance to Rambler bay on the eastern side of the lagoon, about one mile south-westward of Leconte point, the northern entrance point of this bay; Elder rock, with a depth of 5 feet ( $1^m5$ ), lies about  $1\frac{1}{2}$  miles southward of the same point; a shoal, with a depth of  $4\frac{1}{2}$  fathoms ( $8^m2$ ), with a 6-fathom ( $11^m0$ ) patch close north-westward of it, lies 5 cables east-north-eastward of Elder rock.

Minni Minni patch, with a least depth of 2 fathoms ( $3^m7$ ) over it, lies about 2 miles south-south-eastward of Leconte point and three-quarters of a mile offshore; a shoal, with a depth of  $4\frac{1}{2}$  fathoms ( $7^m8$ ), the position of which is approximate, lies about half a mile westward, and a shoal, with a depth of 3 fathoms ( $5^m5$ ), 3 cables north-eastward, of Minni Minni patch.

Westward and south-westward of an imaginary line joining Minni Minni patch and Jennifer shoal are numerous shoal patches, with a

*Charts 3, 2899, 7486.*

*Chart 920.*

least depth of 3 fathoms ( $5^m5$ ), the positions of which can best be seen on the chart.

Several shoals, the positions and depths over which can best be seen on the chart, lie within  $4\frac{1}{2}$  cables of the shores of Rambler bay.

The shoals in the entrance to Rambler bay are very difficult to detect from a ship.

Southward of Minni Minni patch the lagoon is encumbered with dangers, amongst which may be mentioned a shoal, with a least depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ) over it, lying about  $1\frac{1}{2}$  miles south-south-westward of this patch, and marked at its south-eastern end by a red can buoy, also a shoal, with a depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) over it, lying about 4 cables south-westward of East point (*Lat.  $7^\circ 21' S.$ , Long.  $72^\circ 28' E.$* ), and marked on its northern side by a black can buoy, surmounted by a cylinder.

The channel through this part of the lagoon is marked by several barrel buoys, the positions of which can best be seen on the chart; the positions of these buoys should not be relied on.

**Directions.**—As there are no outlying dangers, a vessel, bound for Diego Garcia, may steer towards the island, if the visibility is not less than 2 to 3 miles, but, being low and sometimes enveloped by mist at night, great caution is necessary in making it at such times, and it should not be approached at all during a dark night. A vessel can follow round the coast of the island at any convenient distance; West, Middle, and East islets, which divide the entrance into three passes, can be approached from seaward to within a distance of 3 cables.

A vessel proceeding through the lagoon should have a look-out at the masthead, and the sun should be astern; the bottom can sometimes be seen in depths of 10 fathoms ( $18^m3$ ). The leading beacons, described on page 113, should be brought in line, bearing  $154^\circ$ , which lead through the fairway of Main pass in a least depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ). When Eclipse point bears  $302^\circ$  course should be altered to  $122^\circ$ , keeping this point astern on the  $302^\circ$  bearing, which leads in a least depth of 6 fathoms ( $11^m0$ ) towards the anchorage off Minni Minni.

A vessel can proceed to within about 3 miles of the southern end of the lagoon if the intricate parts of the channel are buoyed beforehand; as already stated, the positions of the barrel buoys marking the channel should not be relied on.

**Anchorage.**—Vessels can obtain anchorage in depths of from 12 to 16 fathoms ( $21^m9$  to  $29^m3$ ) in the broad part of the lagoon, not less than 2 miles within its entrance, taking care to avoid the many shoal patches.

During the north-west monsoon, i.e., from the beginning or middle of December until the beginning or end of April, vessels should anchor on the western side of the lagoon, under the lee of the land. Eclipse bay affords the smoothest water during this monsoon, being protected by Eclipse point and the reef connecting it with West islet. A good berth for a large vessel is about one mile offshore, in depths of 12 fathoms ( $21^m9$ ), fine sand and broken coral, with the centre of West islet, bearing about  $342^\circ$ , distant  $1\frac{1}{2}$  miles. Small vessels, with local knowledge, can anchor closer inshore in depths of about 8 fathoms ( $14^m6$ ), but there are several shoals here.

*Charts 3, 2899, 748b.*

*Chart 920.*

Orient bay, on the eastern side of the lagoon, just within its entrance, affords spacious anchorage in depths of from 8 to 12 fathoms ( $14^m6$  to  $21^m9$ ); it is smooth here during the south-east monsoon, and landing is at all times practicable on Observatory point. A good berth is, in depths of from 8 to 10 fathoms ( $14^m6$  to  $18^m3$ ), sand, with Observatory point, bearing  $344^\circ$ , distant from 2 to 3 cables, or in depths of from 11 to 12 fathoms ( $20^m1$  to  $21^m9$ ), broken coral and sand, with Observatory point, bearing  $333^\circ$ , distant from 5 to 10 cables; the latter anchorage is  $3\frac{1}{2}$  cables from the atoll reef.

Rambler bay affords safe anchorage in depths of about 14 fathoms ( $25^m6$ ), broken coral, at a distance of about one mile offshore. A convenient berth is, in depths of about 15 fathoms ( $27^m4$ ), soft broken coral, with the manager's house on East point (*Lat.  $7^\circ 21' S.$ , Long.  $72^\circ 28' E.$* ), bearing about  $188^\circ$ , distant  $3\frac{1}{4}$  miles. In 1933, H.M.S. *Hawkins* anchored, in depths of 14 fathoms ( $25^m6$ ), coral and sand, with East point bearing  $182^\circ$ , and the houses at Minni Minni, which are in ruins and obscured by trees  $6\frac{1}{2}$  cables north-eastward of Minni Minni knob, bearing  $102^\circ$ , distant  $10\frac{1}{2}$  cables, but care is necessary in approaching this anchorage on account of the shoals in this part of the bay. Rambler bay affords the best anchorage during the south-east-monsoon, the water then being smooth, and boats being able to effect a landing easily at all times. During the north-west monsoon anchorage should be taken up farther offshore, or vessels should proceed to the other side of the lagoon, as a swell and short choppy sea set in.

A vessel desiring to anchor off the settlement at Point Marianne can do so in depths of from 9 to 10 fathoms ( $16^m5$  to  $18^m3$ ), broken coral, good holding ground, with the largest house, bearing about  $264^\circ$ , distant one mile, but care must be taken to avoid a spit, with a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) at its north-eastern edge, which extends about 8 cables east-north-eastward from the point, also the several shoals in this vicinity.

The anchorages off East point are excellent at all times of the year and vessels can anchor, in depths of from 6 to 8 fathoms ( $11^m0$  to  $14^m6$ ), coral, anywhere between the point and the rocky shoal, with a depth of  $1\frac{1}{2}$  fathoms ( $3^m2$ ) over it, lying about 6 cables west-south-westward; or with the point bearing between north and east-north-east, in depths of from  $5\frac{1}{2}$  to 9 fathoms ( $10^m1$  to  $16^m5$ ), coral and sand, taking care to avoid the shoal, with a depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ), marked by a black can buoy, surmounted by a cylinder.

**Piers.**—There is a wooden pier about 2 cables southward of Eclipse point.

The pier at Point Marianne was, in 1939, in ruins, only the head and root remaining.

There is a small pier about  $2\frac{1}{4}$  cables east-south-eastward of East point (*Lat.  $7^\circ 21' S.$ , Long.  $72^\circ 28' E.$* ), off the head of which are some warping buoys. Vessels drawing 12 feet ( $3^m7$ ) can lie alongside it.

*Charts 3, 2899, 748b.*

## CHAPTER V

## ISLANDS AND DANGERS IN MOZAMBIQUE CHANNEL—SLOT VAN CAPELLE

*Chart 2762.*

**ILES COMORES.**—**General remarks.**—Iles Comores (Comoro islands), lying near the centre of the northern entrance to Mozambique channel, are a group of four islands, Grande Comore (Comoro), Mohéli (Mohilla), Anjouan (*Lat. 12° 10' S., Long. 44° 29' E.*), and Mayotte (Mayotta), which are administered by the government of Madagascar. These islands are of volcanic origin, with mountainous summits, rendering it easy to identify them.

The approaches to this group are, mostly, free from dangers, except those to Île Mayotte; the channels that separate them are also free from dangers. Île Mayotte is the only one of the group which affords safe anchorage at all seasons.

The population of this group, in 1936, was 128,608, of whom 700 were Europeans.

The principal imports are cotton fabrics, metals, and rice; the principal exports, sugar, copra, sisal, and vanilla.

Regulations for entering French harbours in time of war will be found on pages 23-25.

**Currents.**—For a description of the ocean currents in the neighbourhood of Iles Comores, see page 17.

*Chart 563, plan of Comoro island.*

**Île Grande Comore.**—**Aspect.**—Île Grande Comore, or Angaziga, is the largest and highest island in the group; it is covered with vegetation everywhere where lava has not spread. The summit of Mont Kartala, 7,874 feet (2,400<sup>m</sup>) high, about 12 miles north-north-westward of the southern extremity of the island, overlooks its southern end; it is in the form of a crater, and after the eruption of 1918, a new mouth was formed, throwing up several fumaroles. The eastern brow of the flat top of the mountain is reported to extend about one mile farther eastward than is shown on the chart. This mountain is dome-shaped, with a regular slope southward, and can be seen, in clear weather, for a distance of about 100 miles.

Île Grande Comore has a large forest and exports timber.

**Northern coast.**—**Dangers.**—From the north-western point of Île Grande Comore the northern coast trends 5½ miles eastward to Ras Habu; the coast is low but rises rapidly to the peaks within it. A reef fringes this coast, extending about 2 cables offshore, and a reef is charted as extending about 7 or 8 cables from the north-western extremity of the island but its existence is doubtful.

*Charts 2762, 597, 748b.*

*Chart 563, plan of Comoro island.*

Ras Habu is a rocky promontory connected with the coast by a low neck of land and, from a distance, appears to be an islet; the town of Bangua is situated half a mile south-westward of Ras Habu.

**Western coast.—Anchorages.**—From the north-western extremity of Ile Grande Comore (Lat.  $11^{\circ} 21' S.$ , Long.  $43^{\circ} 18' E.$ ) the western coast trends about 19 miles southward to Pointe de Lave and is steep-to; there are several villages along this stretch of the coast. 5

*Charts 2066, plan of Mitsamiuli; 563, plan of Comoro island.*

The walled village of Mitsamiuli is situated close southward of the north-western extremity of Ile Grande Comore and is fronted by a sandy beach; a sandbank, with depths of less than 6 feet ( $1^m8$ ) over it, extends as much as 5 cables offshore. A large white house is conspicuous on the seafront in the middle of the village; farther southward is a hill forming a crumbling crater, and a grey tomb, with three baobabs, surrounded by a grove of coconut palms, stands on the coast. 10 15

Temporary anchorage, in case of necessity, may be obtained in depths of from 30 to 37 fathoms ( $54^m9$  to  $67^m7$ ) about 11 cables west-north-westward of this village, but it is not recommended.

*Chart 2066, plan of Mitsamiuli.* 20

The *Antares*, in 1932, anchored in depths of 13 fathoms ( $23^m8$ ), about a cable from depths of  $5\frac{1}{2}$  fathoms ( $10^m1$ ), with the southern edge of the large white house on the sea-front in line with the northern edge of a house with a grey roof, bearing  $114^{\circ}$ , the tomb  $147^{\circ}$ , and the northern entrance point of the bay  $083^{\circ}$ . 25

*Chart 563, plan of Comoro island.* 25

Itsandha, a walled village, with a smaller village close northward of it, is situated on the coast,  $1\frac{1}{2}$  miles north-eastward of Pointe de Lave. There is good landing at the head of the cove on the shore of which stands Itsandha, near an enormous tree; this cove is filled with a reef, which dries. 30

The anchorage off Itsandha is very indifferent; the depths are great, and it is very close to the coastal reef. Vessels should not anchor in depths of less than 19 fathoms ( $34^m7$ ), and it would be better to anchor in depths of about 25 fathoms ( $45^m7$ ) midway between the two entrance points of this cove. 35

Between Itsandha and Moroni, 2 miles south-south-westward, the coast is rocky.

Pointe de Lave, low and black, was formed during the eruption of 1858. 40

*Chart 2762, plan of Moroni anchorage.*

**Mouillage de Moroni.**—The bay, at the head of which stands the town of Moroni, is encumbered by a shallow flat of sand and coral; Souadzou (Suadsu), an islet, lies on this flat, about three-quarters of a cable westward of the northern extremity of the town, and is connected with the shore by a reef, above water and sunken. 45

A wall surrounds the town, in which stands a tall white minaret. The Resident resides at Moroni (Lat.  $11^{\circ} 42' S.$ , Long.  $43^{\circ} 15' E.$ ).

There is steamer communication with the other islands of the group and the Madagascan ports. 50

Fresh provisions are scarce.

**Lights.—Beacons.**—A beacon, consisting of a whitewashed square stone tower with a pointed roof, 16 feet ( $4^m9$ ) in height, stands on Souadzou; Gerezani beacon, a whitewashed square stone tower with

*Charts 563, 2762, 597, 748b.*

*Chart 2762, plan of Moroni anchorage.*

a pointed roof, 66 feet (20<sup>m</sup>1) in height, is situated behind the town, about 3 cables east-south-eastward of the beacon on Souadzou. These two beacons and the Residency, about 2½ cables east-south-eastward of

5 Gerezani beacon, are all in line when bearing 115°.

A small beacon, consisting of a whitewashed square stone tower with a pointed roof, 10 feet (3<sup>m</sup>0) in height, stands on the coast about 2½ cables west-south-westward of the minaret; Chezani beacon, a similar structure, 39 feet (11<sup>m</sup>9) in height, is situated about 1½ cables

10 southward of the small beacon.

Lights are occasionally exhibited from the four beacons described above.

A light is exhibited, at an elevation of 91 feet (27<sup>m</sup>7), from the minaret in the town, about 1½ cables westward of Gerezani beacon.

15 Biladi beacon, a whitewashed tower with a pointed roof, stands on the southern entrance point of the bay.

**Anchorage.—Directions.**—The anchorage off Moroni is very bad; it is open to south-westerly winds and the holding ground is not good. Vessels are often forced to put to sea during the dry season.

20 A vessel should approach with the beacon on Souadzou in line with Gerezani beacon, bearing 115°, and anchor, when Chezani beacon and the small beacon 1½ cables northward come into line bearing 172°, in depths of from 12 to 19 fathoms (21<sup>m</sup>9 to 34<sup>m</sup>7), sand and coral.

It is dangerous to approach Moroni at night as the lights are only

25 visible from a short distance, and are often extinguished; the low-lying town is frequently obscured.

It is not prudent to communicate with the shore when the sea is breaking over it, except by means of native boats.

There is a small harbour for coasters, close to the minaret, which

30 is lined with quays. A vessel wishing to enter it must proceed along the coast in front of the town, in order to avoid a shoal which encumbers its entrance.

**Port limits.**—The limits of the port are, approximately, as follows:—

From the north-western corner of the quays in the coasters' harbour,

35 an imaginary line drawn in a 340° direction for a distance of 9½ cables, thence in a 270° direction for 8½ cables, thence in a 180° direction for 11 cables, and thence in an 083° direction for about 11½ cables to the high water line.

**Signal station.—Storm signals.**—There is a signal station at

40 Moroni, with which vessels can communicate by day. Signals indicating the locality threatened by a cyclone, *see* pages 27-28, are displayed.

*Chart 563, plan of Comoro island.*

**Coast.—Aspect.—Dangers.**—The coast between Moroni (*Lat.*

45 11° 42' S., *Long.* 43° 15' E.) and Iconi, about 2½ miles southward, is low, and fringed by a reef. Iconi hill, close northward of the village of the same name, stands on the coast, and from westward shows two peaks separated by a deep ravine, but from southward it takes the form of a saddle; on the northern summit are the ruins of a white stone

50 house.

M'dé is a village about 2 miles southward of Moroni and one mile inland.

Mondzaza (Mantzeza) is a village near the coast, 1½ miles south-south-eastward of Iconi; Mondzaza hill, a crater, close northward of

*Charts 563, 2762, 597, 748b.*

*Chart 563, plan of Comoro island.*

the village, slopes to the coast, forming regular and parallel ridges, and seen from westward presents a bluff face.

The coast between Iconi and Mondzaza is fringed by a reef extending as far as 4 cables offshore.

**South-western coast.—Dangers.—Off-lying danger.**—From a point about half a mile southward of Mondzaza hill the coast trends  $16\frac{1}{2}$  miles south-eastward to the southern extremity of the island and is low and rocky; with the exception of a group of sunken rocks extending about three-quarters of a mile south-eastward of the point half a mile southward of Mondzaza hill and to a distance of about half a mile offshore, the south-western coast of Ile Grande Comore appears to be steep-to, as native craft coast along it within hailing distance. There are many villages along this stretch of the coast.

Récif Vailheu, lying about 14 miles west-south-westward of Moroni light and 12 miles offshore, is reported to dry in places at extreme low tides, and the sea does not always break over it; it can be identified by the discoloration of the water and, with good visibility, it can be seen from a certain distance from aloft.

Vessels navigating in this vicinity at night should, when on the parallel of the southern extremity of Ile Grande Comore, keep westward of the meridian of  $43^{\circ}$  E., in order to avoid Récif Vailheu.

**South-eastern coast.—Dangers.—Anchorage.**—From the southern extremity of Ile Grande Comore the south-eastern coast, which is low and rocky, trends  $4\frac{1}{2}$  miles north-eastward to the south-eastern point of the island and is fringed by a reef extending as far as half a mile offshore. The coast is backed by a plain, which begins to rise about  $1\frac{1}{2}$  miles inland.

*Charts 2066, plan of Shendini; 563, plan of Comoro island.*

Shendini, a village, stands on the shore of a slight indentation in the coast  $2\frac{1}{2}$  miles north-eastward of the southern extremity of the island; a bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, fronts the village and extends as far as  $3\frac{1}{2}$  cables offshore.

*Chart 2066, plan of Shendini.*

A shoal, with a depth of 19 feet ( $5^m8$ ) over it, lies near the anchorage and  $5\frac{3}{4}$  cables east-south-eastward of a conspicuous white house situated in the village.

There is anchorage off Shendini (*Lat.  $11^{\circ} 54'$  S., Long.  $43^{\circ} 29'$  E.*) in depths of about 18 fathoms ( $32^m9$ ), about half a cable south-westward of the shoal, with a depth of 19 feet ( $5^m8$ ), with the white house in the village bearing  $307^{\circ}$ , Pointe Ouest, the south-western entrance point, bearing  $258^{\circ}$ , and Pointe Nord, the north-eastern entrance point, bearing  $023^{\circ}$ .

Small craft with local knowledge find shelter inside the reef fronting Shendini; the passage through this reef is narrow and lies close southward of the village.

*Chart 563, plan of Comoro island.*

**Eastern coast.—Aspect.**—On the eastern side of Ile Grande Comore the land rises gradually to the mountains within; a conspicuous table-topped mountain, 1,640 feet ( $499^m9$ ) high, is situated near the coast, about 5 miles east-north-eastward of Mont Kartala, and there are lava cliffs  $4\frac{1}{2}$  miles northward of this table-topped mountain.

The eastern coast is practically inaccessible.

*Charts 563, 2762, 597, 748b.*



*Chart 563, plan of Comoro island.*

Fomboni, a fortified town, stands on the coast  $4\frac{1}{2}$  miles south-south-eastward of the 1,640-foot (499<sup>m</sup>9) table-topped mountain.

The south-eastern point of the island is low, with a conical crater on it, and is fringed by a coral reef; the village of Mahalé, with a mosque, is situated close northward of this crater.

*Charts 563, plan of Mohilla island; 2762.*

**Ile Mohéli.—General remarks.**—Ile Mohéli, the smallest of the group, lies about 23 miles south-south-eastward of Ile Grande Comore, and is well wooded up to the summit of the mountains, which rise to an elevation of about 2,950 feet (899<sup>m</sup>2); it is very fertile and coconut palms are abundant. The constant dampness of the soil renders the climate unhealthy.

*Chart 563, plan of Mohilla island.*

**Western coast.—Dangers.**—From Pointe Oani, the northern extremity of Ile Mohéli, the western coast of the island trends  $1\frac{1}{2}$  miles south-westward and thence about 2 miles southward to Miringoni; between Miringoni and Pointe Miremani, the south-western point of the island, about 6 miles south-south-eastward, the coast recedes.

The village of Domoni is situated on the coast half a mile south-westward of Pointe Oani, and a black rock, above water, lies close offshore about one mile west-south-westward of the same point.

Chiconi, a reef with depths of less than 6 feet (1<sup>m</sup>8) over it, lies about  $1\frac{1}{2}$  miles south-south-westward of the black rock mentioned above and 2 cables offshore.

A rock, above water, lies  $2\frac{1}{2}$  cables south-westward of the point on which stands the village of Miringoni.

The village of Luaia stands on the coast  $3\frac{1}{2}$  miles south-eastward of Miringoni, and an islet of the same name lies close offshore half a mile north-westward of this village.

A reef, extending as much as 5 cables offshore, fringes the coast between the village of Luaia and Pointe Miremani; lying on the coastal reef about one mile south-westward of the mouth of Rivière Mionconi, which flows into the sea about one mile south-south-eastward of the village of Luaia, is a black rock covered with bushes.

**Anchorage.**—Anchorage can be obtained in depths of from 8 to 13 fathoms (14<sup>m</sup>6 to 23<sup>m</sup>8), about  $1\frac{1}{2}$  miles offshore, off Domoni (*Lat.* 12° 14' S., *Long.* 43° 39' E.); behind the beach is a ravine near which landing can be effected.

Southward of Miringoni, anchorage may be obtained from one to  $1\frac{1}{2}$  miles offshore; during the south-east monsoon good shelter may be found about one mile westward of the mouth of Rivière Mionconi.

**Southern coast.—Islets and dangers.**—The southern coast of Ile Mohéli, between Pointe Miremani and Numa Choa, a town about  $3\frac{1}{2}$  miles eastward, is indented and fringed with a reef, which extends about one mile south-eastward of Pointe Miremani and half a mile offshore.

Rochers Bateau (Sail rocks), lying close offshore 4 cables south-eastward of Pointe Miremani, are steep, and attain an elevation of 49 feet (14<sup>m</sup>9).

The village of Miremani is situated one mile east-north-eastward of Pointe Miremani, and close southward of it is Anse Miremani.

Roches Plates (Flat rocks), lying  $1\frac{1}{2}$  miles east-south-eastward of Rochers Bateau and 4 cables offshore, dry.

*Charts 758, 2762, 597, 748b.*

*Chart 563, plan of Mohilla island.*

The town of Numa Choa is surrounded by a wall ; a sandy beach fronts the town. It is reported that there are no sharks here and that bathing is practicable.

Pointe Numa Choa is a rounded high red cliff overhanging the sandy beach fronting the town ; there are tall mangrove trees on this cliff.

The southern coast eastward of Numa Choa is fringed by a reef, and vessels should give it a berth of at least 3 miles.

Ile Moa, lying  $1\frac{1}{4}$  miles east-south-eastward of Pointe Numa Choa and about three-quarters of a mile offshore, is high, and is easily identified by its summit, which is a truncated cone ; Ile Foro, lying at the edge of the coastal reef about one mile eastward of Ile Moa and half a mile offshore, is high and indented.

Port Numa Choa, eastward of the town of that name, is formed by a gap, 2 cables wide, in the coastal reef, where there are depths of from 6 to 10 fathoms ( $11^m0$  to  $18^m3$ ) ; it is sheltered from south-eastward by Ile Moa and from south-westward by the off-lying islands.

The south-eastern extremity of Ile Mohéli is steep-to.

**Anchorage.—Directions.—Shoals.**—Anse Miremani affords well sheltered anchorage for small vessels with local knowledge in depths of from 10 to 20 fathoms ( $18^m3$  to  $36^m6$ ), sand and mud.

There is good anchorage in Port Numa Choa for vessels with local knowledge in depths of 10 fathoms ( $18^m3$ ) with Numa Choa bearing  $288^\circ$ , the north-eastern side of Ile Moa  $150^\circ$ , and the western extremity of that island  $172^\circ$ . The coastal reef in the vicinity of the anchorage is steep-to, and a large part of it dries ; when this reef is covered it can generally be easily seen from aloft.

A vessel bound for this anchorage and coming from westward should pass between the southern side of Ile Mohéli (*Lat.  $12^\circ 24'$  S., Long.  $43^\circ 51'$  E.*) and the off-lying islands southward, steering with the northern extremity of Ile Moa in line with the southern extremity of Ile Foro, bearing about  $093^\circ$  ; she should stand close towards the northern point of Ile Moa in order to avoid the coastal reef extending from the southern coast of Ile Mohéli.

After passing the northern extremity of Ile Moa a vessel should alter course west-north-westward and bring the south-western extremity of Pointe Numa Choa to bear  $293^\circ$ , which leads through the fairway to the anchorage ; when on this line of bearing a peak, situated about one mile eastward of Miremani, will be seen just open south-westward of the south-western extremity of Pointe Numa Choa, and care must be taken not to bring this peak on a more northerly bearing.

A vessel coming from eastward and bound for Port Numa Choa should, as stated above, give the southern coast of Ile Mohéli a berth of at least 3 miles, and steer with Rochers Bateau, bearing  $291^\circ$ , and open southward of Ile Moa. This course leads about 3 cables northward of a shoal, with a depth of  $4\frac{3}{4}$  fathoms ( $8^m7$ ) over it, lying about  $1\frac{3}{4}$  miles south-eastward of Ile Moa, and about 4 cables south-westward of a shoal, with a depth of 4 feet ( $1^m2$ ), about 2 miles east south-eastward of the same island ; if possessing local knowledge the northern extremity of Ile Moa in line with a hill eastward of Numa Choa, bearing  $302^\circ$ , leads between these shoals and in depths of not less than 7 fathoms ( $12^m8$ ). When Ile Foro bears  $353^\circ$  a vessel should bear northward so as to pass about midway between this island and Ile Moa, then, bring-

*Chart 563, plan of Mohilla island.*

ing the south-western extremity of Pointe Numa Choa to bear  $293^{\circ}$ , proceed as directed above.

Vessels which do not wish to lie in Port Numa Choa can anchor westward of the town; landing can always be effected on the beach close to the town.

**Off-lying islands and dangers.**—Off the western part of the southern coast of Ile Mohéli lies a chain of volcanic islands, about 2 miles offshore; about one mile southward of the islands is a bank with a least depth of  $6\frac{1}{2}$  fathoms ( $11^m9$ ) over it. The channels between these islands have a least depth of 8 fathoms ( $14^m6$ ) in them, but they should only be used by vessels with local knowledge.

Ile Magnuni is the westernmost of these islands; Ile Maussi (Marosi island),  $4\frac{1}{2}$  cables south-eastward of the eastern extremity of Ile Magnuni, is connected with the western extremity of Ile Canzuni (Kanzuni) by a bank which dries.

Ile Djumadjini (Chumadini island) lies  $1\frac{1}{2}$  miles eastward of Ile Canzuni; the coasts of the northern half of this island are fringed by reefs extending as far as 4 cables offshore.

Ile Sanzi lies 4 cables eastward of Ile Djumadjini; a spit, with depths of less than 6 feet ( $1^m8$ ) over it, extends about  $1\frac{1}{2}$  cables north-north-westward of the northern extremity of this island; Roche Percée, lying close off the southern extremity of Ile Sanzi, is an above-water rock, pierced with round holes, and is steep-to.

Breakers, the position of which is approximate, were reported, in 1936, about 2 miles east-south-eastward of the eastern extremity of Ile Sanzi (*Lat.  $12^{\circ} 26' S.$ , Long.  $43^{\circ} 44' E.$* ).

Ile Mbuhu lies about 7 cables east-north-eastward of the north-eastern side of Ile Sanzi, and should be given a berth of at least  $4\frac{1}{2}$  cables; a reef, which dries, extends about one cable southward of its southern extremity.

The shoal, with a depth of  $4\frac{1}{2}$  fathoms ( $8^m7$ ), lying about 2 miles east-south-eastward of Ile Mbuhu, and the shoal, with a depth of 4 feet ( $1^m2$ ), about  $2\frac{1}{2}$  miles eastward of the same island, were remarked on on page 121.

**Anchorage.**—H.M.S. *Undine*, in 1883, anchored, in depths of 18 fathoms ( $32^m9$ ), west-north-westward of Ile Magnuni, with the western extremity of Ile Mohéli bearing about  $013^{\circ}$  and the southern extremity of Ile Canzuni bearing about  $114^{\circ}$ .

There is anchorage for vessels with local knowledge off the western coast of Ile Canzuni, in depths of from 10 to 15 fathoms ( $18^m3$  to  $27^m4$ ), about  $1\frac{1}{2}$  cables east-south-eastward of the south-eastern extremity of Ile Maussi, and well sheltered from south-easterly winds. Vessels should be ready to weigh at any time in case of a shift of wind.

There is anchorage for vessels with local knowledge in depths of about 11 fathoms ( $20^m1$ ), sand, eastward of Ile Djumadjini, and also south-westward of that island.

**North-eastern coast.**—**Islets and dangers.**—From Pointe Oani the north-eastern coast of Ile Mohéli trends  $5\frac{1}{2}$  miles east-south-eastward to Fomboni, and is reported to be fringed by a barrier reef, between which and the coast is a narrow channel only available for small vessels with local knowledge. From Fomboni the coast trends  $9\frac{1}{2}$  miles south-eastward to the eastern extremity of the island and thence about 2 miles southward to its south-eastern extremity; the

*Charts 758, 2762, 597.*

*Chart 563, plan of Mohilla island.*

most conspicuous feature on this part of the coast is a square-topped summit situated near the coast, about midway between Fomboni and the south-eastern extremity of the island.

The coast for about 2 miles northward of the south-eastern extremity of the island is fringed by a reef, which dries, extending as much as 9 cables offshore; Ilot Samia and Ilot Miangoni lie on the outer edge of this reef,  $1\frac{1}{2}$  miles and close north-eastward, respectively, of the south-eastern extremity of the island.

**Anchorage.**—There is anchorage all along this coast in depths of from 8 to 14 fathoms ( $14^m6$  to  $25^m6$ ), but vessels should not approach it within one mile; close offshore, northward of the square-topped summit, there is good anchorage for small vessels with local knowledge.

**Tidal streams.**—Off the north-eastern side of Ile Mohéli the flood tidal stream sets westward, but it turns before high water; the ebb stream sets eastward and turns before low water.

**Off-lying islets.**—Ilot Muchaco, or Rocher Blanc, lying 4 miles eastward of the eastern extremity of Ile Mohéli, is about 100 feet ( $30^m5$ ) high, and is steep-to, except on its western side; it has a flat summit and can be identified at night.

Ilot Mianga (*Lat.*  $12^\circ 20' S.$ , *Long.*  $43^\circ 55' E.$ ), from which a reef extends  $1\frac{1}{2}$  cables north-north-eastward, lies  $1\frac{1}{2}$  miles eastward of Ilot Samia.

*Chart 2762.*

**Obstruction.**—An obstruction was reported, in 1916, by the s.s. *City of Manchester*, to lie about  $9\frac{1}{2}$  miles eastward of the south-eastern extremity of Ile Mohéli.

*Chart 2066, plan of Fomboni bay and road.*

**Mouillage de Fomboni.—Dangers.**—The town of Fomboni, where the Resident resides, stands at the head of a small bay and is fronted by a reef, which dries, and extends as far as 6 cables offshore, but some detached rocks and shoals lie a little farther offshore.

From a vessel approaching Fomboni several houses and buildings, more or less in ruins, are visible, and most conspicuous is the Sultan's residence, on which there is a flagstaff; the church, a fine white building, is also conspicuous from seaward.

There is steamer communication with the other islands of the group and with the Madagascan ports.

Landing can be effected in Anse Douény (Douéni cove), a narrow gap in the coastal reef fronting the town, which affords shelter to native craft, but it is not accessible at low water; when there is a surf the entrance to this gap is plainly visible. The flagstaff on the Sultan's residence, bearing  $205^\circ$ , leads through the centre of this gap.

There is another landing place, preferable to the one just described, in Anse Tsoa, a gap in the coastal reef, one mile east-south-eastward of Anse Douény.

A shoal, with a depth of 29 feet ( $8^m8$ ) over it, lies  $1\frac{1}{2}$  miles north-eastward of the flagstaff on the Sultan's residence.

**Signal station.**—There is a signal station at Fomboni, from which storm signals are displayed by day. See pages 27-28.

**Port limits.**—The limits of the port are as follows:—

From a position on the high water line  $326^\circ$  from the flagstaff on the Sultan's residence, a line drawn in a  $326^\circ$  direction for a distance of  $9\frac{1}{2}$  cables, thence in an  $000^\circ$  direction for  $10\frac{3}{4}$  cables, thence in an  $090^\circ$

*Chart 2066, plan of Fomboni bay and road.*

direction for  $19\frac{1}{2}$  cables, thence in a  $180^\circ$  direction for 16 cables and thence in a  $249^\circ$  direction for about  $11\frac{1}{2}$  cables to the high water line.

**Beacons.**—Four square-shaped beacons, painted white, have been erected as anchorage marks. Beacon A stands in front of the Sultan's flagstaff, Beacon B, about  $3\frac{3}{4}$  cables south-south-westward of Beacon A, Beacon C stands on the coast about  $5\frac{1}{2}$  cables east-south-eastward of Beacon A, and Beacon D about half a cable south-south-eastward of Beacon C; Beacons C and D are not easy to distinguish.

10 **Anchorage.**—**Directions.**—The anchorage off Fomboni is good during the south-west monsoon, although a troublesome swell is sometimes experienced; during the north-east monsoon the swell is very heavy and the anchorage is not safe.

Large vessels should not anchor in depths of less than 9 fathoms 15 ( $16^m5$ ).

A good anchorage for large vessels is, in depths of from about 9 to 10 fathoms ( $16^m5$  to  $18^m3$ ), with the flagstaff on the Sultan's residence (*Lat.*  $12^\circ 16'$  S., *Long.*  $43^\circ 45'$  E.) bearing  $205^\circ$ , the chapel  $179^\circ$ , the Resident's house  $172^\circ$ , and the square-topped summit, midway between 20 Fomboni and the south-eastern extremity of the island, bearing  $129^\circ$ .

Medium-sized vessels bound for an anchorage off Fomboni should steer for the flagstaff on the Sultan's residence, bearing  $211^\circ$ , and anchor in depths of from 7 to 8 fathoms ( $12^m8$  to  $14^m6$ ) about  $8\frac{1}{2}$  cables offshore. This anchorage should be approached with caution.

25 *Charts 563, plan of Anjouan island; 758.*

**Ile Anjouan.**—**General remarks.**—L'île Anjouan lying about 24 miles east-north-eastward of Ile Mohéli, is very fertile. From a distance of about 50 miles eastward the island appears as two peaks, the northern one being the higher; from nearer a succession of wooded 30 peaks may be seen, rising one behind the other. Pic d'Anjouan, 5,250 feet ( $1,600^m2$ ) high, the summit of the island, situated in the centre, is conical in shape and, except in the early morning, is rarely visible, being usually enveloped in cloud.

The climate is on the whole healthy, the coasts being nearly every- 35 where free from mangrove swamps.

*Chart 563, plan of Anjouan island.*

**Northern side.**—**Islet and dangers.**—**Lights.**—**Beacons.**—Between the western extremity of Ile Anjouan and its northern extremity, about  $16\frac{1}{2}$  miles east-north-eastward, the coast forms a bay, and is 40 fringed in places by coral reefs; the reefs show up green at high water, and the sea breaks over them at half-tide unless it is calm. It is very deep a short distance offshore.

La Selle (Saddle islet) is a saddle-shaped islet, about 400 feet ( $121^m9$ ) high, lying on the coastal reef, about 3 cables north-westward of the 45 western end of Ile Anjouan.

Off La Selle, as off the other extremities of Ile Anjouan, tide-rips give an appearance of shallow water beyond the reef to an extent of a mile or two. The bottom is probably rocky and uneven, but in passing over these appearances of broken water no bottom has ever 50 been found with the hand-lead, and it is considered that no dangers exist beyond the outer edge of the reef, which is plainly visible except at high water.

An above-water rock lies about 6 cables eastward of Pointe Afombani and about  $2\frac{1}{2}$  cables offshore; Pointe Afombani is situated about

*Charts 563, 758, 2762, 597, 748a, 748b.*

*Chart 563, plan of Anjouan island.*

5 miles east-south-eastward of the north-western extremity of Ile Anjouan.

*Chart 2066, plan of Mutsamudu and Patsi roads.*

The town of Mutsamudu stands on low ground on the coast about 5 miles east-north-eastward of Pointe Afombani, and is surrounded by walls; it is overlooked by a ruined citadel, which is black and conspicuous, and surmounted by a flagstaff. A tall white minaret, standing in the middle of the town, is conspicuous.

The Residency and hospital are situated on a hill about three- 10 quarters of a mile east-south-eastward of the citadel.

A masonry jetty extends from the shore south-westward of the town (*Lat. 12° 09' S., Long. 44° 24' E.*), and is easy of access by boats. There is one 5-ton crane.

There is steamer communication with the other islands of the group 15 and with the Madagascan ports.

Some fresh provisions are obtainable.

Landing can be effected close southward of the town, but the approach is difficult; there is a break in the coastal reef westward of the town, and this can be used at all states of the tide. 20

Two lights are exhibited, the front light from a stone tower, with a square base and a pointed roof, 16 feet (4<sup>m</sup>9) in height, situated about 9 cables south-westward of the citadel flagstaff; and the rear light at an elevation of 98 feet (29<sup>m</sup>9) from a stone beacon with a square base and a pointed roof, 13 feet (4<sup>m</sup>0) in height, situated about a quarter 25 of a mile south-eastward of the front light. These beacons are known as Faget beacons.

A light is occasionally exhibited, at an elevation of 226 feet (68<sup>m</sup>9), from a stone beacon, 7 feet (2<sup>m</sup>1) in height, situated at the look-out station about three-quarters of a cable south-eastward of the citadel 30 flagstaff.

Two lights are occasionally exhibited, the front light from a stone tower, 13 feet (4<sup>m</sup>0) in height, situated at the western end of the town front, and the rear light from an iron column, 7 feet (2<sup>m</sup>1) in height, situated near the Custom house. These lights are in line bearing 066.° 35

The coastal reef between Mutsamudu and Pointe Mirondsi, about 4½ cables north-north-eastward, extends as far as 2 cables offshore, and a group of rocks, with depths of less than 6 feet (1<sup>m</sup>8) over them, fringe this latter point; there is also an above-water rock lying close off this point. 40

Between Pointe Mirondsi and Pointe Oani, about 2 miles north-eastward, is Rade d'Oani (Patsi road); the coast here forms a bay and is fringed by a reef.

The village of Mirondsi is situated on the southern shore of this bay, about half a mile eastward of Pointe Mirondsi. 45

Near the middle of the bay is Pointe Patsy (Patsi), on which stands Wilson's storehouse, with a red roof. Two conspicuous white beacons, surmounted by cages, are situated close south-eastward of Wilson's storehouse; the existence of these beacons was reported, in 1941, to be doubtful. 50

A shoal, with a depth of one foot (0<sup>m</sup>3) over it, lies about one cable offshore, 4 cables south-south-westward of Pointe Patsy.

A small jetty, where landing can be effected, extends from the northern side of Pointe Patsy.

*Charts 563, 758, 2762.*

*Chart 2066, plan of Mutsamudu and Patsi roads.*

The town of Oani, with a minaret, is situated close to the coast about half a mile north-eastward of Pointe Patsy.

*Chart 563, plan of Anjouan island.*

- 5 A good berth should be given to the northern extremity of Ile Anjouan (Lat.  $12^{\circ} 04' S.$ , Long.  $44^{\circ} 28' E.$ ).

**Anchorage.**—There is reported to be good anchorage in depths of 12 fathoms ( $21^m9$ ) on the northern side of La Selle.

*Chart 2066, plan of Mutsamudu and Patsi roads.*

- 10 The two anchorages, that off the town of Mutsamudu, and Mouillage de la Fontaine, west-south-westward, are very restricted and close to the coastal reef; vessels must be prepared to anchor immediately as the depths decrease rapidly.

- A vessel making the latter anchorage should anchor with the Faget  
15 beacons in line, bearing  $133^{\circ}$ , and the red roof of Wilson's storehouse, bearing  $052^{\circ}$ , just open north-westward of Pointe Mirondsi; or, with the beacons near the Custom house in line, bearing  $066^{\circ}$ , and the rear Faget beacon bearing  $139^{\circ}$ . This anchorage, which is about 2 cables from the 3-fathom ( $5^m5$ ) line, is the safer of the two, and there are  
20 depths of from 14 to 15 fathoms ( $25^m6$  to  $27^m4$ ), sand and shells.

- The town anchorage is closer to the coastal reef; vessels should anchor with the red roof of Wilson's storehouse, bearing  $052^{\circ}$ , just open north-westward of Pointe Mirondsi, and the highest point of a triple summit in line with the north-eastern extremity of the cemetery bearing  
25  $134^{\circ}$ . This anchorage is not recommended, as the anchoring marks are difficult to identify and, although the depths at the anchorage are 12 fathoms ( $21^m9$ ), a vessel will be only half a cable from the 3-fathom ( $5^m5$ ) line.

The limits of the port of Mutsamudu are as follows:—

- 30 From a position on the high water line  $337^{\circ}$  distant about one cable from the flagstaff on the citadel, a line drawn in a  $337^{\circ}$  direction for a distance of 6 cables, thence in a  $270^{\circ}$  direction for  $11\frac{1}{2}$  cables, thence in a  $180^{\circ}$  direction for  $12\frac{1}{2}$  cables, thence in an  $090^{\circ}$  direction for  $2\frac{1}{2}$  cables, and thence in an  $058^{\circ}$  direction for about  $11\frac{1}{2}$  cables to the high water  
35 line.

The two white beacons close south-eastward of Wilson's storehouse in line, bearing  $097^{\circ}$ , lead to an anchorage in depths of about 20 fathoms ( $36^m6$ ), coral and sand, about 3 cables from the coastal reef, with Pointe Oani bearing about  $030^{\circ}$ .

- 40 **Storm signals.**—There is a storm signal station at Mutsamudu.

*Chart 563, plan of Anjouan island.*

- South-western side.—Dangers.**—From the western extremity of Ile Anjouan the coast trends about 22 miles south-eastward to the southern extremity of that island; for the first 13 miles, as far as  
45 Pomoni, it is bordered by reefs extending, in places, about one mile offshore.

- Assimpao is a village on the coast about  $7\frac{1}{2}$  miles east-south-eastward of the western extremity of Ile Anjouan; there is a break in the coastal reef here, but it is reported to be encumbered with coral reefs,  
50 and suitable only for boats.

- From Pomoni (Lat.  $12^{\circ} 15' S.$ , Long.  $44^{\circ} 25' E.$ ) to the southern extremity of the island the coast appears to be steeper, and in many places there is no coastal reef. About one mile south-eastward of Pomoni is a bay in which it is reported that there is anchorage, but it has not  
55 been examined.

*Charts 563, 758, 2762, 597.*

*Chart 2066, plan of Pomoni harbour.*

**Mouillage de Pomoni.—Dangers.**—This anchorage is a natural basin formed by the coastal reef, which dries ; it can be used by small vessels with a length not exceeding about 200 feet (61<sup>m</sup>0).

It lies under high land, which is shaped like a saddle, close to two peaks resembling a dog's ears ; a white square chimney, surmounting a sugar refinery, about three-quarters of a mile south-eastward of the entrance to the harbour, is conspicuous. 5

The coastal reef on the north-western side of the harbour dries in parts at springs, and is crossed by a boat channel which connects with the sea. 10

The coastal reef on the southern side of the harbour dries at springs, and is steep-to ; there is a boat channel leading across this reef from the harbour to abreast the sugar refinery.

A shoal, with a least depth of 4 feet (1<sup>m</sup>2), coral, over it, lies in the entrance to the harbour, on the western side of the fairway ; this shoal is difficult to distinguish, and the sea only breaks over it at long intervals. 15

**Beacons.**—Two leading beacons for the entrance, consisting of loopholed walls, are situated, the front beacon on the shore northward of the harbour, and the rear beacon 1½ cables from the front beacon. 20

Two white iron cylindrical beacons, standing at an elevation of 160 feet (48<sup>m</sup>8), and conspicuous among the surrounding verdure, are situated one about 2½ cables northward and the other about a mile south-eastward of the front leading beacon. 25

**Directions.**—A vessel bound for Mouillage de Pomoni should steer in with the leading beacons in line, bearing 009°, which leads close eastward of the shoal with a depth of 4 feet (1<sup>m</sup>2) ; care should be taken not to have too much way, so as to be able to turn short round the north-western extremity of the southern reef. 30

**Anchorage.**—There is good anchorage outside the reefs in depths of 14 fathoms (25<sup>m</sup>6), about 3 cables from the mouth of the stream which flows into the sea close south-eastward of the sugar refinery, with the sugar refinery chimney bearing between 037° and 048° ; there is a break in the coastal reef between these bearings. Northward of this sector the coastal reef extends about 2½ cables offshore, and southward of this sector there are some detached rocks which dry. 35

There are depths of from 7 to 12 fathoms (12<sup>m</sup>8 to 21<sup>m</sup>9), black sand, in the harbour, but the space is restricted. Vessels should moor with their heads north-westward or south-eastward according to the monsoon season. 40

During the southerly monsoon it is fairly calm in the harbour, except when it blows hard causing a high sea, when it would be dangerous to remain ; in May, rollers are heavy at times along the coast. 45

Fresh provisions are plentiful. 45

During the northerly monsoon light land and sea breezes generally prevail, and occasionally shift from one to the other several times during the day.

*Chart 563, plan of Anjouan island.*

**Eastern side.—Dangers.—Light.—Beacons.**—From the northern extremity of Ile Anjouan (Lat. 12° 04' S., Long. 44° 28' E,) the coast trends about 19 miles south-south-eastward to Morne de la Pointe, its south-eastern extremity ; it is high and rocky, with but few indentations, and is mostly steep-to, but it is not advisable to approach it closely. 55

*Charts 563, 758, 2762, 597.*



*Chart 563, plan of Anjouan island.*

The village of Bambao is situated on the coast, about 8 miles southward of the northern extremity of the island.

*Chart 2066, plan of Bambao anchorage.*

- 5 The old palace of the Sultan, situated about  $2\frac{1}{2}$  cables north-north-westward of Bambao, is surmounted by a flagstaff; it is reported that a light is occasionally exhibited from this flagstaff.

- A white octagonal beacon, with a black horizontal band, known as M'Sangani beacon, stands on the coast, about 3 cables southward of  
10 Bambao; behind this beacon, and not easily discernible, is a white hangar.

- Achombo rear leading beacon, consisting of two octagonal masonry columns nearly joined together, 26 feet ( $7^m9$ ) in height, is situated about 5 cables south-westward of Bambao village; a front leading  
15 beacon, consisting of an octagonal masonry column, 26 feet ( $7^m9$ ) in height, is situated about  $3\frac{1}{2}$  cables eastward of Achombo beacon; these beacons are painted white with a black horizontal band and are conspicuous, as they stand on high ground, which is devoid of vegetation.

- 20 Gégé beacon, consisting of an octagonal masonry column, 26 feet ( $7^m9$ ) in height, painted white with a red horizontal band, stands on a sandy point, about  $1\frac{1}{2}$  miles south-south-eastward of the front leading beacon described above.

- Anchorage.**—There are two anchorages off Bambao, sand and  
25 good holding ground; the northern anchorage, in a depth of about 16 fathoms ( $29^m3$ ), is on the line of the leading beacons, with Gégé beacon bearing  $184^\circ$ ; at this anchorage the depths increase rapidly seaward.

- The southern anchorage, in a depth of about 11 fathoms ( $20^m1$ ), is  
30 in a position where Achombo rear leading beacon bears  $301^\circ$ , and Gégé beacon bears  $193^\circ$ ; this anchorage is adjacent to an unexamined rocky shoal, with a depth of about 6 fathoms ( $11^m0$ ) over it, which appears dangerous.

- Depths of 6 fathoms ( $11^m0$ ) lie in the southern approach to these  
35 anchorages, about  $1\frac{1}{2}$  miles south-south-eastward of Bambao.

Lighters of from 5 to 10 tons capacity are available.

*Chart 563, plan of Anjouan island.*

- Coast.—Dangers.**—Between Bambao and Deumoni, a village  
about  $3\frac{1}{2}$  miles south-south-eastward, the coast is fringed by rocks,  
40 above water and sunken.

There is a boat harbour within the reefs at Deumoni.

- The southern extremity of Ile Anjouan is bluff, of considerable elevation, and fringed by a reef extending about 3 cables offshore; two rocks, above water, stand on the south-eastern extremity of the  
45 coastal reef. During the south-west monsoon, there is occasionally a heavy sea, with overfalls, off this point; at times there have been heavy rollers as if it was shallow, but no bottom has been found with the hand-lead.

*Charts 2741, 758.*

- 50 **Ile Mayotte.—Aspect.**—Ile Mayotte (*Lat.  $12^\circ 52'$  S., Long.  $45^\circ 11'$  E.*), lying about 36 miles south-eastward of Ile Anjouan, is conspicuous from all directions on account of its hilly contours; the coasts are low, and at many places inundated by the sea. There are numerous mangrove trees. Mavégani, the highest mountain, situated

*Charts 563, 758, 2762, 597, 748a, 748b.*

*Charts 2741, 758.*

about 7 miles northward of the southern extremity of the island, has a double summit, the western 2,165 feet (659<sup>m</sup>9) and the other, 2,106 feet (641<sup>m</sup>9) high, and can be seen from a distance; Ouchongui (Uchongui), a sugarloaf peak, 1,900 feet (579<sup>m</sup>1) high, which rises 5 from comparatively low land about 4½ miles south-south-westward of Mavégani, is most conspicuous.

*Chart 2741.*

From northward Muraniembé, a mountain, 1,535 feet (467<sup>m</sup>9) high, situated about 2½ miles south-south-westward of Cap Duamuniu, the 10 northern extremity of the island, and Montsapéré, 1,830 feet (557<sup>m</sup>8) high, about 7 miles south-eastward of Muraniembé, are conspicuous; from southward Ouchongui is the first summit to be seen; from eastward Morne Carré, a square-topped hill about 1½ miles eastward of Ouchongui, can be identified; Combani, about 1,600 feet (487<sup>m</sup>7) high, 15 situated near the centre of the island, about 3 miles south-westward of Montsapéré, is a fairly conspicuous conical summit, but it is not distinguishable from south-eastward or southward.

See views on chart 2741.

The population, which, in 1942, amounted to about 16,000, is composed of Antalotas, Arabs, Sakalavas, and Indians, with several 20 hundred Europeans.

There are several villages. The old capital, under the first Sultan, Chinguné, is situated on the western side of the island. On the eastern coast, a native town stands at the foot of Montsapéré. 25

The Governor of Iles Comores, who is also Governor of Ile Mayotte, resides at Dzaoudzi, the principal port of the island.

Fresh provisions are difficult to procure without the permission of the government. The money in use is the same as at Madagascar.

**Currents.**—The currents in the neighbourhood of Ile Mayotte are 30 very variable, but close inshore they usually follow the direction of the coast and reefs, and attain at times a rate of 3½ knots in the passages.

Ile Mayotte appears to lie southward of the general west-going current which passes close to Ile Anjouan; between these two islands the current usually sets south-westward, but at times south-eastward 35 at a considerable rate. During a calm the British vessel *President* was set from off the north-western extremity of Ile Mayotte, round the eastern side, to a position off its south-eastern extremity, in two days.

There is frequently an east-going current near the southern extremity of this island. 40

**Barrier reef.**—Ile Mayotte (*Lat. 12° 52' S., Long. 45° 11' E.*) is surrounded by a barrier reef, with many breaks and passes in it, but the only ones which are sufficiently known for vessels to navigate with confidence are Passe M'Zambourou (Zamburu pass), northward of the island, and Passe Saziley du Milieu (Saziley Middle passage) off its 45 south-eastern extremity.

Inside the barrier reef there are large and safe anchorages. The reefs are, in general, fairly steep-to, but they should not be approached on account of the variable and often strong currents. The reefs are usually distinguishable from the change in the colour of the water 50 over them, and by the sea breaking over them except at high water, or when it is very calm. The positions of the various reefs can best be seen on the chart.

**Western and southern sides.—Aspect.**—Between Cap Duamuniu

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 2741.*

and Pointe Boëni, about  $14\frac{1}{2}$  miles southward, the coast is fringed by a reef; the only conspicuous feature, apart from those described on pages 128-129, is Morne Rouge (Red Mount), about  $5\frac{1}{2}$  miles north-north-eastward of Pointe Boëni.

Between Cap Duamuniu and Pointe Acua, 650 feet (198<sup>m</sup>1) high, about  $6\frac{1}{2}$  miles south-south-westward, the coast is high, but from a little northward of Morne Rouge to Pointe Boëni it is low and marshy.

Baie de Boëni is entered between Pointe Boëni and Pointe Doumoueli, 10 about 3 miles north-north-eastward; it is encumbered with dangers.

Between Pointe Boëni and Ilot Bouni (Buni islet), about 7 miles south-south-eastward, the only conspicuous feature is Pointe Cani, about  $3\frac{1}{2}$  miles southward of Pointe Boëni, rising about one mile eastward to Mont Cani; Ilot Bouni is connected with the coast by a reef 15 which dries. A conspicuous clump of trees stands on a hill about one mile north-north-eastward of the northern extremity of this islet.

Pointe Dapani, about  $2\frac{1}{2}$  miles east-north-eastward of Ilot Bouni, is high, and is conspicuous, especially from eastward; Pointe Saziley, the south-eastern point of Ile Mayotte, about  $1\frac{1}{2}$  miles north-eastward 20 of Pointe Dapani, is high, rocky, and conspicuous.

**Off-lying islands and dangers.**—Ile M'Zambourou (Zamburu island), 886 feet (270<sup>m</sup>0) high, lying about  $3\frac{1}{2}$  miles westward of Cap Duamuniu, is saddle-shaped when seen from north-eastward or south-westward; it lies at the southern end of a reef, with depths of less 25 than 6 feet (1<sup>m</sup>8) over it, which extends about three-quarters of a mile northward, half a mile eastward and westward, and  $1\frac{1}{2}$  miles south-westward of the island; this reef is connected with Récif du Nord (North reef), about 2 miles north-eastward, by a ridge with a least depth of  $3\frac{1}{2}$  fathoms (5<sup>m</sup>9).

30 Iles Choazil, two islets 164 and 230 feet (50<sup>m</sup>0 and 70<sup>m</sup>1) high, respectively, situated on the same reef, which has depths of less than 6 feet (1<sup>m</sup>8) over it, lie about  $1\frac{1}{2}$  miles south-eastward of Ile M'Zambourou and half a mile offshore.

A detached reef, with depths of less than 6 feet (1<sup>m</sup>8) over it, lies 35 about 7 miles west-north-westward of the western extremity of Ile M'Zambourou; it is about one mile in extent.

Banc de l'Iris, with a least depth of 13 fathoms (23<sup>m</sup>8) over it, lies about 4 miles north-north-westward of the northern extremity of Ile M'Zambourou (*Lat.* 12° 38' S., *Long.* 45° 03' E.); and extends for about 40  $1\frac{1}{2}$  miles in a north-north-westerly direction.

Banc de la Prudente, extending about 3 miles north-eastward from the northern extremity of the barrier reef westward of Ile Mayotte, has a least depth of 6 fathoms (11<sup>m</sup>0) over it

Récif du Nord, with depths of less than 6 feet (1<sup>m</sup>8) over it, extends 45 about 3 miles eastward and westward and  $1\frac{1}{2}$  miles northward and southward.

Off-lying the western and southern coasts of Ile Mayotte, inside the barrier reef, is a chain of detached reefs which prevent access to the coast; their positions can best be seen on the chart.

50 Banc Boa Sadia, a shoal, with a least depth of 2 fathoms (3<sup>m</sup>7), lies about one mile south-westward of Iles Choazil.

**Anchorage.**—There is anchorage north-eastward of Ile M'Zambourou in depths of about 10 fathoms (18<sup>m</sup>3) with the northern extremity of that island bearing 270° and Pointe Mohila, about  $5\frac{1}{2}$  miles south-

*Charts 758, 2762, 597.*

*Chart 2741.*

westward of Cap Duamuniu, bearing  $185^{\circ}$ ; this anchorage is very close to a dangerous coral shoal and should only be taken up in case of emergency.

There is also temporary anchorage, in depths of from 6 to 14 fathoms (11<sup>m</sup>0 to 25<sup>m</sup>6), on Banc de la Prudente, about 2 miles north-westward of Ile M'Zambourou.

Baie de Boëni affords sheltered anchorage.

**Passes.**—The passes through the western side of the barrier reef have not been closely examined; the leading marks for them are not good, and they are not recommended.

Passe des Iles Choazil, about half a mile wide, the entrance to which lies about 4 miles west-south-westward of Ile M'Zambourou, has a least depth of  $5\frac{1}{2}$  fathoms (10<sup>m</sup>1) in the fairway.

Grande Passe de l'Ouest, about  $7\frac{1}{2}$  miles southward of Passe des Iles Choazil, is not safe; there are probably other dangers in it than those charted.

Passe du Morne Rouge, about  $2\frac{1}{2}$  miles southward of Grande Passe de l'Ouest, is rather far from the coast to allow the leading marks, the northern fall of Morne Rouge in line with the southern fall of Montsa-péré, bearing about  $057^{\circ}$ , being easily identified.

Passe Boëni, about 3 miles southward of Passe du Morne Rouge, is deep, but is also rather far from the coast to allow the leading marks to be easily identified.

Passe aux Bateaux (Boat passage), about  $2\frac{1}{2}$  miles southward of Passe Boëni, is narrow but deep.

**Directions.**—A vessel using Passe des Iles Choazil should steer with the northern Choazil islet in line with Morne H., a hill, 328 feet (100<sup>m</sup>0) high, about  $1\frac{1}{2}$  miles south-westward of Cap Duamuniu, bearing  $084^{\circ}$ ; when within a prudent distance of Iles Choazil she can bear northward and pass about midway between the northern Choazil islet and Ile M'Zambourou, thence into Passe M'Zambourou (page 135).

If a vessel can make Passe du Morne Rouge it is easy to proceed into Baie de Boëni, steering with Pointe Est (*Lat.  $12^{\circ} 53' S.$ , Long.  $45^{\circ} 07' E.$* ), the south-western entrance point of this bay, in line with Ouchongui, bearing  $148^{\circ}$ ; thence a vessel should bring Ile Caroni, at the head of the bay, to bear  $126^{\circ}$ , which leads into the middle of the bay, and thence alter course southward into convenient depths for anchoring. Pointe Acua hill in line with the summit of Ile M'Zambourou, bearing about  $351^{\circ}$ , leads westward of a dangerous reef lying about  $2\frac{1}{2}$  miles north-westward of Pointe Doumoueli.

Pointe Boëni in line with the eastern summit of Mavégani, bearing about  $078^{\circ}$  (*see view I on chart*), leads through Passe Boëni. A shoal, on which s.s. *Ile de la Réunion* grounded, in 1913, lies about  $3\frac{1}{2}$  miles west-south-westward of Pointe Boëni; the position of this shoal is approximate.

Pointe Cani, bearing  $082^{\circ}$ , and seen between Mont Cani and Ouchongui (*see view K on chart*), leads through Passe aux Bateaux.

There is no opening in the barrier reef between Passe aux Bateaux and Passe Saziley du Sud (Saziley South passage), about 14 miles eastward; this area is deep and safe for navigation, with only a few detached dangers in it.

**North-eastern side.—Islets and dangers.—Beacons.**—Between Cap Duamuniu and Pointe Makoen, about  $9\frac{1}{2}$  miles south-eastward,

*Charts 758, 2762, 597.*

*Chart 2741.*

the north-eastern coast of Ile Mayotte, is mostly high and rocky, and much indented; several islets and detached reefs lie close offshore. See views on chart.

- 5 Cap Duamuniu is the northern extremity of a narrow peninsula, 637 feet (194<sup>m</sup>2) high; the cliffy extremity of the cape is surmounted by a round hill, 256 feet (78<sup>m</sup>0) high. An area of foul ground extends about one mile eastward of this cape.

- 10 Ilot Andrema, 82 feet (25<sup>m</sup>0) high, fronting a bay of the same name, lies about 1½ miles south-south-eastward of Cap Duamuniu, and is covered with vegetation; Ilot Dzugoma, 60 feet (18<sup>m</sup>3) high, about one mile south-eastward of the former islet, is situated near the centre of an area of foul ground, and is surmounted by a beacon.

- 15 Pointe Bandaboa, about 3½ miles south-south-eastward of Cap Duamuniu, is high, and has a white tower on it; it is steep-to.

- Between Pointe Bandaboa and Pointe Longoni, a low projection about 2½ miles east-south-eastward, the coast forms Baie Longoni, with low-lying land at its head; the shores of this bay are fringed by a reef, which dries, extending as far as half a mile offshore. Ile Verte, lying 20 close offshore, about 1½ miles south-south-eastward of Pointe Bandaboa, is surmounted by a beacon; there are high hills in this vicinity.

*Chart 2741, plan of Longoni cove.*

Close southward of Pointe Longoni is a cove of the same name; it has moderate depths, mud bottom.

- 25 *Chart 2741.*

A detached reef, which dries, lies close northward of Pointe Longoni, and Ilot Blanche lies on the coastal reef about a quarter of a mile eastward of this point.

- 30 From Pointe Longoni (*Lat. 12° 43' S., Long. 45° 11' E.*) the coast trends about 2½ miles east-south-eastward to Pointe Congo and is fringed by a reef extending only a short distance offshore.

- From Pointe Congo the coast trends about 1½ miles south-eastward to Pointe Makoen, and is fronted by foul ground extending as much as one mile offshore; there are several detached reefs lying off this 35 stretch of the coast.

Nosy Effatsy, a group of above-water rocks, lie about half a mile east-south-eastward of Pointe Makoen, at the south-eastern edge of the foul ground mentioned above.

*Chart 2741, with plan of approaches to Zaudzi.*

- 40 Grand Récif du Nord-Est (Great North-East reef) extends from a point about 2½ miles north-eastward of Cap Duamuniu about 12½ miles south-eastward to the island of Pamanzi; the reef has depths of less than 6 feet (1<sup>m</sup>8) over it, and at its south-western edge, about 1½ miles eastward of Pointe Makoen, lies Ilot Aombé, 109 feet (33<sup>m</sup>2) high.

- 45 *Chart 2741.*

Between Grand Récif du Nord-Est and the islets and dangers described above are numerous dangers the positions of which can best be seen on the chart.

- Anchorage.**—Baie Longoni affords good sheltered anchorage in 50 depths of from 10 to 20 fathoms (18<sup>m</sup>3 to 36<sup>m</sup>6); Ile Verte in line with Combani, bearing about 174°, leads into this bay, clear of all dangers.

*Chart 2741, plan of approaches to Zaudzi.*

**Eastern side.—Aspect.—Light.—Beacons.**—From Pointe Makoen the coast trends about half a mile south-south-eastward to

*Charts 2741, 758, 2762, 597.*

*Chart 2741, plan of approaches to Zaudzi.*

Pointe Amoha (Amaha), and thence about  $1\frac{1}{4}$  miles southward to Pointe Choa; it is fringed by a reef.

Pointe Choa is the eastern extremity of the Mamoutzou peninsula, and in Anse Choa, close northward of this peninsula, is a landing jetty from which a light is exhibited. The coastal reef extends about  $8\frac{1}{2}$  cables southward of Pointe Choa, and its eastern edge is steep-to. *Chart 2741.*

Between Pointe Choa and Pointe Amoro, about  $5\frac{1}{4}$  miles south-south-westward, the coast is low and marshy, and bordered in many places by mangrove trees; it is indented by a succession of small bays, the points of which are fringed by reefs. Several reefs and shoals, the positions of which can best be seen on the chart, front the entrances to some of these bays.

Three leading beacons stand in the vicinity of Pointe Amoro. The front and middle beacons, each consisting of a white rectangular stone structure, surmounted by a white mast, are situated about 4 cables south-south-westward and 5 cables south-westward, respectively, of the extremity of Pointe Amoro, and are both conspicuous in morning sunlight; about  $4\frac{1}{4}$  cables west-north-westward of the middle beacon is a masonry beacon, 33 feet ( $10^m1$ ) in height, painted in black and white horizontal bands, and surmounted by a globe. The rear beacon is not visible from a vessel within the outer reefs when southward of Pointe Amoro (*Lat.  $12^{\circ} 52' S.$ , Long.  $45^{\circ} 14' E.$* ) as it is obscured by a ridge of hills.

Roche Blanchie, a point about three-quarters of a mile south-south-westward of Pointe Amoro, is marked by a white rectangular wall. Both Pointe Amoro and Roche Blanchie should be given a berth of 3 cables.

Anse Bandéli lies between Roche Blanchie and Pointe Bambo, about  $2\frac{1}{4}$  miles south-south-westward; the shores of this bay are swampy, and the greater part of the bay is filled by the coastal reef, which extends about a quarter of a mile eastward of Pointe Bambo.

Between Pointe Bambo and Pointe Saziley (page 130) the coast forms Anse Bambo and Anse Miambani, separated from each other by a point, from which a coral reef extends about three-quarters of a mile south-eastward; within the hilly shores of these bays the land is low and swampy.

Pointe Saziley, on which stands a triangular beacon, painted in red and white horizontal bands, may be identified by a hill, 545 feet ( $166^m1$ ) high, close westward of it; a triangular beacon, painted in black and white horizontal bands, stands on this hill.

*Chart 2741, with plan of approaches to Zaudzi.*

**Off-lying islands and dangers.—Buoys.**—Pamanzi, a hilly island, is, from a distance, saddle-shaped; its northern summit is a crater filled with sulphurous water; the southern summit, 682 feet ( $208^m0$ ) high, has a small white house on it, formerly the look-out station. The eastern side of the island terminates in a high and almost perpendicular cliff, which is a good landmark for vessels approaching from southward.

Ilôt Mognaméri (Mouniaméri islet), 125 feet ( $38^m1$ ) high, lies in mid-channel between the main island and the north-western side of Pamanzi; a reef extends about  $2\frac{1}{4}$  cables eastward of Ilôt Mognaméri.

Ilôt Cacoxou (Cacazou), and Ilôt Vatou, 92 and 43 feet ( $28^m0$  and

*Chart 2741, with plan of approaches to Zaudzi.*

13<sup>m</sup>1) high, respectively, lie about  $3\frac{1}{2}$  cables eastward of Ilot Mognaméri, and are connected with each other by a reef; a narrow channel separates this reef from the reef extending eastward of Ilot Mognaméri.

- 5 Ilot Dzaoudzi (Zaudzi), lying about  $4\frac{1}{2}$  cables south-south-westward of Ilot Vatou, is connected with Pamanzi by a small tongue of land on which is a causeway; a reef, which dries, extends about  $3\frac{1}{2}$  cables westward of the western extremity of Ilot Dzaoudzi, and may usually be distinguished by the colour of the water over it; a red conical  
10 buoy, surmounted by a cone, is moored about one cable westward of the western extremity of this reef.

The eastern extremity of Ilot Mognaméri in line with the western extremity of Ilot Aombé, bearing  $036^\circ$ , or the eastern extremity of Bouzi (Buzi), an islet about  $1\frac{1}{2}$  miles south-westward of Ilot Dzaoudzi,  
15 in line with the eastern extremity of the western islet of Iles Ajangua, about one mile southward of Bouzi, bearing  $186^\circ$ , leads westward of the reef extending westward of Ilot Dzaoudzi.

Baie de Pamanzi, on the eastern side of Ilot Dzaoudzi, is encumbered with rocks and shoals, the positions of which can best be seen on the  
20 plan. The northernmost of these dangers, lying about  $1\frac{1}{2}$  cables eastward of the northern extremity of Ilot Dzaoudzi (*Lat.  $12^\circ 27' S.$ , Long.  $45^\circ 16' E.$* ), has a depth of one fathom (1<sup>m</sup>8) over it, and is marked by a red cylindrical buoy; this buoy was reported, in 1941, to have disappeared.

- 25 Roche Oreste, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies about 2 cables westward of Ilot Dzaoudzi.

Two shoals, each having a depth of 2 fathoms (3<sup>m</sup>7) over it, lie about one cable south-eastward of Roche Oreste.

- Bouzi, which lies about  $1\frac{1}{2}$  miles southward of Pointe Choa, is completely wooded, and attains an elevation of 535 feet (163<sup>m</sup>1).  
30

*Chart 2741.*

- Ilot du Récif (Reef islet), about three-quarters of a mile southward of Pointe Sud (South point), the southern extremity of Pamanzi, is conspicuous, and lies on Récif Pamanzi, a reef extending about  $3\frac{1}{2}$  miles  
35 southward of Pamanzi.

Iles Ajangua are easily identified; vessels should always pass westward of these islets on account of the detached shoals between them and Récif Pamanzi eastward.

- Ilot Bandéli lies about one mile south-eastward of Roche Blanchie;  
40 Récif du Laminor, two detached reefs about one mile south-westward of this islet, are not easy to distinguish as the sea seldom breaks over them.

Ilot Bambo, lying about three-quarters of a mile south-south-westward of Pointe Bambo, is a good landmark.

- 45 See views on chart.

A chain of reefs extends about 8 miles south-south-westward of Récif Pamanzi; on the southernmost of these reefs, and about one mile south-eastward of Pointe Saziley, is a sandy islet, 3 feet (0<sup>m</sup>9) high.

- Caution.**—The relative positions of points on the chart between  
50 Anse Bandéli and Pamanzi are reported to be incorrect; chart 2741 should, therefore, be used with caution.

**Passes.—General remarks.**—**Caution.**—The landmarks for a vessel making any of the passes described below are easily identified; with good visibility, the reefs are generally visible, especially at low

*Charts 758, 2762, 597.*

*Chart 2741.*

water, which is the best time to proceed through these passes, provided the draught of water permits.

The buoyage of the passes in the barrier reef conforms with the French system of buoyage; in entering red conical buoys are left on the starboard hand, and black cylindrical buoys on the port hand.

The buoys are often swept away by the sea, and are not always replaced in their charted positions. Vessels must not rely either on their presence or their colour.

**Passe M'Zambourou.—Dangers.—Beacons.—Directions.—**

Passe M'Zambourou leads from northward through the barrier reef surrounding Ile Mayotte, between the eastern extremity of Récif du Nord and the north-western extremity of Grand Récif du Nord-Est, and thence to the anchorages off Pamanzi. See views A and D on chart.

The passage between Récif du Nord and the reef extending northward and eastward of Ile M'Zambourou (*Lat. 12° 38' S., Long. 45° 03' E.*) is not recommended as there may be less depths than those shown on the chart.

The least depth in the fairway of Passe M'Zambourou is 7 fathoms (12<sup>m</sup>8), with the exception of a detached 5-fathom (9<sup>m</sup>1) patch lying about 1½ miles east-south-eastward of Cap Duamuniu.

A vessel making this pass should bring Cap Duamuniu in line with the summit of Muraniembé, bearing 203°, until the beacon on Ilot Dzugoma is in line with the white tower on Pointe Bandaboa, bearing 174°, when a vessel should alter course southward and steer for it that bearing; a vessel should, however, keep Ilot Dzugoma beacon slightly open eastward of the white tower on Pointe Bandaboa, while passing westward of Banc de la Surprise.

Banc de la Surprise, which partly dries, lies close eastward of the fairway, about 1½ miles east-north-eastward of Cap Duamuniu; Récif Chaloupe, with a least depth of 1½ fathoms (3<sup>m</sup>2) over it, lies about half a mile west-south-westward of Banc de la Surprise.

A chain of shoals extends about 1½ miles south-eastward of Banc de la Surprise; Banc Laclocheterie, the south-easternmost of these shoals, has a least depth of 3½ fathoms (6<sup>m</sup>9) over it.

The track passes between Vauclose and Bancs Jumeaux; Vauclose, a reef, which dries, lies about half a mile southward of Récif Chaloupe and three-quarters of a mile east-south-eastward of Cap Duamuniu; Bancs Jumeaux, about half a mile eastward of Vauclose, have a least depth of 4 feet (1<sup>m</sup>2) over them.

When the northern extremity of Ilot Andrema is in line with Morne H., bearing 282°, a vessel should alter course eastward, and steer with these marks in line, astern, bearing 102°, until Ile Verte is in line with the summit of Combani, bearing 175°, which should be steered for until Morne H. is in line with the summit of Ile M'Zambourou, bearing about 293°, which leads along the north-eastern coast of Ile Mayotte, passing about midway between Récif de la Prévoyante and the detached reef lying close northward of Pointe Longoni.

Récif de la Prévoyante, lying about 1½ miles northward of Pointe Longoni, partly dries.

The last mentioned course leads in deep water, free from dangers for about 4 miles, passing about one mile south-westward of Récif Peïtro (Peiho), a rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lying about 1½ miles north-eastward of Pointe Longoni.

*Charts 758, 2762, 597.*



*Chart 2741, with plan of approaches to Zaudzi.*

After passing north-eastward of Pointe Congo a white triangular beacon standing on a hillside, about  $1\frac{1}{2}$  miles southward of the northern extremity of Pamanzi, in line with the old look-out station on the southern summit of this island, bearing  $141^\circ$ , leads through the fairway towards Pamanzi.

When Ilot Cacooux (Lat.  $12^\circ 46' S.$ , Long.  $45^\circ 17' E.$ ) bears  $227^\circ$  a vessel can alter course south-south-westward for the desired anchorage in Baie de Pamanzi.

10 *Chart 2741.*

**Passe Longogori.**—Passe Longogori, about  $2\frac{1}{2}$  miles southward of Pamanzi, is only available for small craft with local knowledge.

**Passe Bandéli.**—Passe Bandéli, about  $1\frac{1}{2}$  miles south-westward of Passe Longogori, lying between Récif Ajangua and Récif Bandéli, is generally the pass taken by vessels coming from eastward bound for an anchorage at Dzaoudzi, and is recommended for vessels drawing not more than 21 feet ( $6^m4$ ).

Ilot Bandéli can be identified from some distance offshore by a gap in the hillside, resembling a quarry.

20 This pass is not accessible at all states of the tide; it is difficult to navigate on account of its narrowness and the strength of the tidal streams.

**Tidal streams.**—The tidal streams are strong at high water, and change very rapidly; at the south-eastern entrance to the pass the flood stream sets south-westward, and at the inner end the ebb stream sets south-eastward.

**Directions.—Beacons.**—The three beacons in the vicinity of Pointe Amoro, in line, bearing  $295^\circ$ , lead through this pass, but they are difficult to identify if the light is not favourable, which is particularly the case in the afternoon.

The southern extremity of Récif Ajangua extends to within a short distance of the leading line just described; care should be taken, therefore, not to get northward of the alignment.

The passage between the reefs is marked on either side by a white framework beacon, 12 feet ( $3^m7$ ) in height; these beacons are not to be depended upon.

See view E on chart.

When the summit of Ouchongui bears  $236^\circ$  and is open north-westward of Ilot Bandéli, a vessel is clear of the pass and should steer northward to pass about three-quarters of a mile from Pointe Amoro and a quarter of a mile westward of the western islet of Iles Ajangua; thence she should pass south-eastward and eastward of Bouzi and proceed to the anchorage off Dzaoudzi as directed on page 138, taking care to avoid a detached rock, which dries, lying about a quarter of a mile from the north-eastern side of Bouzi.

**Fausse passe.**—Fausse passe (False passage), between Récif Bandéli and Récif Bambo, is encumbered with shoals, and should not be used.

**Passes Saziley.—Caution.**—The three Saziley passages described below have not been closely examined, and are not used by the Messageries Maritimes vessels.

**Passe Saziley du Nord.**—Passe Saziley du Nord (Saziley North passage) is narrow, and lies between the southern edge of Récif Bambo and a detached coral reef southward of it. It is unmarked.

*Charts 758, 2762, 597.*

*Chart 2741.*

**Passe Saziley du Milieu.**—**Directions.**—Passe Saziley du Milieu (Saziley Middle passage), about half a mile southward of Passe Saziley du Nord, is about 4 cables wide, with a least depth, in 1942, of 24 feet (7<sup>m</sup>3).

The two beacons on Pointe Saziley (*Lat. 12° 58' S., Long. 45° 13' E.*), in line, bearing 253°, lead through this passage in a least depth of 24 feet (7<sup>m</sup>3).

A vessel coming from eastward should approach with the summit of Ouchongui, bearing about 280°, and just open southward of Morne Carré (*see* view G on chart), until about 4 miles outside the passage, when the hill on Pointe Saziley will appear completely isolated; this hill should then be steered for until the two beacons on Pointe Saziley can be identified. Pointe Saziley may be approached to within a short distance on the alignment of the beacons.

When within Passe Saziley du Milieu a vessel proceeding northward should bring the eastern side of Ilot Bandéli in line with the eastern fall of Pamanzi, bearing 030°, which leads between Ilot Bambo and Récif Bambo; this course should be held until Pointe Bambo is in line with the summit of Ouchongui, bearing 243°, whence course should be altered for Roche Blanchie, bearing 341°, which leads about a quarter of a mile eastward of Récif du Laminoir. Pointe Amoro should be given a berth of about three-quarters of a mile and a vessel should proceed as directed on page 136.

**Tidal streams.**—In Passe Saziley du Milieu the stream begins to set north-eastward at high water and attains its maximum rate about 2 hours before low water; a rate of 2½ knots has been observed at ordinary tides.

The flood stream, which is much weaker, sets north-westward and the stream turns 2 hours after low water.

**Passe Saziley du Sud.**—Passe Saziley du Sud, about 1½ miles southward of Passe Saziley du Milieu, being unmarked and unexamined, should be avoided. In 1936, there was a least depth of 20 feet (6<sup>m</sup>1) in the fairway of this passage.

*Chart 2741, with plan of approaches to Zaudzi.*

**Anchorage.**—**Light.**—**Directions.**—Vessels should anchor northward or southward of Ilot Dzaoudzi according to the season.

During the dry season, May to October, there is well sheltered anchorage in Baie de Pamanzi in depths of from 8 to 14 fathoms (14<sup>m</sup>6 to 25<sup>m</sup>6), north-westward of the cylindrical red buoy; it is always calm at this season.

There is also good anchorage further north-eastward, in a depth of 9 fathoms (16<sup>m</sup>5), with a pylon, situated about 2 cables south-eastward of the north-western extremity of Ilot Dzaoudzi, bearing 215°, distant 4½ cables.

During the winter, November to April, vessels should anchor southward of Ilot Dzaoudzi, where the holding ground is good throughout; care must be exercised to avoid Roche Oreste.

Good anchorage in depths of 11 fathoms (20<sup>m</sup>1), mud, may be obtained with the western extremity of Ilot Dzaoudzi bearing 011° and the southern extremity of Pamanzi 134°.

There is a landing jetty on both the eastern and western sides of Ilot Dzaoudzi (*Lat. 12° 47' S., Long. 45° 16' E.*).

A light is periodically exhibited, at an elevation of 26 feet (7<sup>m</sup>9),

*Chart 2741, with plan of approaches to Zaudzi.*

from a concrete column, 3 feet (0<sup>m</sup>9) in height, situated on Dzaoudzi west jetty head.

A vessel coming from southward and bound for an anchorage in Baie de Pamanzi should, from northward of Bouzi, bring the eastern extremity of that islet in line with the eastern extremity of the western islet of Îles Ajangua, astern, bearing 186°, until the radio mast on Ilot Dzaoudzi is in line with the old look-out station on the southern summit of Pamanzi, bearing 104°. A vessel should then bear north-eastward and eastward towards the desired anchorage; this approach is somewhat difficult, as the vessel has two sharp turns to make, the tidal streams are strong, and strong breezes sometimes blow across the bay.

Provisions are scarce at Dzaoudzi. There is a small hospital here.

**Port limits.**—The limits of the port are as follows:—

On the north: a line drawn from Pointe Amoha in an 028° direction for a distance of about 8½ cables, thence in an 090° direction for a distance of about 16 cables, passing through the southern extremity of Ilot Aombé, and thence in a 180° direction to the high water line, on Pamanzi, at its intersection with the approach leading line, which is the signal station and two beacons (*see* page 136), in line, bearing 141°.

On the south: a line drawn from the southern extremity of Pointe Choa in a 180° direction 12½ cables to Bouzi, thence in an 090° direction for 19 cables and thence in an 000° direction to the high water line on Pamanzi.

**Communications.**—There is steamer communication with Europe, the East African, and Madagascan ports. Dzaoudzi is connected with the general telegraph system and has a radio station. *See* page 26.

**Signal station.**—**Storm signals.**—There is a signal station at Dzaoudzi, from which storm signals are shown; *see* pages 27-28.

*Charts 724, plan of Glorioso islands; 758.*

#### ISLANDS AND REEFS EASTWARD OF ILES COMORES.—

**Îles Glorieuses.**—Îles Glorieuses (Glorioso islands) lie about 110 miles west-north-westward of the northern extremity of Madagascar; this group consists of a sandbank, with an island at each end of it, and several rocks lying between them. The bank, with depths of less than 100 fathoms (182<sup>m</sup>9), on which this sandbank is situated, extends about 11½ miles north-eastward and south-westward and 9 miles east-south-eastward and west-north-westward.

*Chart 724, plan of Glorioso islands.*

There is no break or channel in this sandbank, though about 1½ miles eastward of Île Glorieuse, the south-western, and larger, island, it is only about 5 cables wide, and, as the sea does not always break over this part while it is breaking heavily elsewhere, there is danger of mistaking it for a passage; the greater part of the sandbank dries. A narrow spit extends about 2½ miles north-north-eastward of Île Glorieuse (*Lat.* 11° 34' S., *Long.* 47° 18' E.). The coastline of these sandy islands changes with the time of the year, especially at the height of the north-east and south-west monsoons.

Île du Lys (Lise), lying on the north-western side of this sandbank, about 2½ miles from its eastern extremity, when seen from a distance

*Charts 2741, 758, 2762, 597, 748b.*

*Chart 724, plan of Glorioso islands.*

of about 10 miles northward, appears as three small hummocks with trees between, the latter attaining an elevation of about 35 feet (10<sup>m</sup>7) ; at its southern end is a conspicuous sandhill. A salt water lagoon occupies the centre of the island, nearly dividing it into two. The island is inhabited and produces copra and guano. 5

Rocher Epave (Wreck rock), one foot (0<sup>m</sup>3) high, lies about 3 cables north-eastward of Ile du Lys.

Ile Glorieuse, lying at the south-western end of the sandbank, is flat and sandy ; it is planted with casuarina trees, which can be seen from a distance of about 15 miles. There is a settlement on the north-western end of the island. 10

Discoloured water, having the appearance of a reef, has been observed extending about 2 miles westward from Ile Glorieuse ; caution is, therefore, necessary when approaching this island. 15

Roches Vertes, lying about 1½ miles eastward of Ile Glorieuse, consist of three rocks, about 3 feet (0<sup>m</sup>9) high ; Rocher Sud (South rock), about 3 cables southward of Ile Glorieuse, is also about 3 feet (0<sup>m</sup>9) high.

Green turtle are abundant and form the staple food of the inhabitants. 20  
*Chart 2762.*

**Currents.**—Between lat. 10° S. and Iles Glorieuses, the current sets strongly westward ; during May to September it may attain a rate of 3 knots.

Because of the uncertainty of the behaviour of the currents close to these islands, vessels are recommended to avoid them at night, and by day to pass westward of them. 25

*Chart 724, plan of Glorioso islands.*

**Tidal streams.**—The tidal streams are weak ; the flood stream sets westward and the ebb stream eastward. 30

During the *Alert's* visit, in 1882, which lasted five days, the tides were irregular, the time of high water being the same each day. At the anchorage off the north-western side of Ile Glorieuse the ebb stream was found setting west-south-westward at a rate of about 1½ knots. At the anchorage off Ile du Lys the tidal streams were weak, the flood stream setting westward and the ebb stream eastward. 35

**Anchorage.**—H.M.S. *Alert*, in 1882, found good anchorage in depths of 8 fathoms (14<sup>m</sup>6), sand, and level bottom, with Ile du Lys bearing 151°, distant about 1½ miles. 40

In 1921, the *Bellatrix* anchored 5½ cables, 288°, from the observation spot on Ile du Lys (Lat. 11° 30' S., Long. 47° 23' E.), and, in the same year, anchored about 2½ miles north-eastward of Ile Glorieuse, in depths of 5½ fathoms (10<sup>m</sup>1), sand and coral, indifferent holding ground, with Roches Vertes bearing 170°. 45

In 1931, the *Antares* anchored westward of Ile Glorieuse, in depths of 16 fathoms (29<sup>m</sup>3), with the northern extremity of the trees on that island in line with Roches Vertes bearing 094°.

*Chart 758.*

**Geyser reef.**—Geyser reef, lying about 60 miles south-westward of Ile Glorieuse, is a dangerous group of rocks and sandbanks, the southern part of which dries in parts ; the depths over the north-eastern part of this reef are not known, but H.M.S. *Geyser* described it as a barrier of shoal water which it was considered dangerous to attempt 50

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 758.*

to cross; there are depths of from 17 to 20 fathoms (31<sup>m</sup>1 to 36<sup>m</sup>6) on the south-eastern side of this reef.

Geyser reef is so named from having been partially examined, in 1848, by H.M.S. *Geyser*; it was originally discovered, in 1682, by the *Firebrass*, and seen, in 1766, by the *Devonshire*.

In 1934, the *Antarès* reported that Geyser reef was probably 4 miles farther northward than it is shown on the charts.

The *Shannon*, in 1842, was wrecked on Geyser reef. She described it as a dangerous reef extending east-north-eastward and west-south-westward, with numerous rocks, most of which dry, many being visible at half ebb. At three-quarters ebb, seventeen rocks, large and small, above water were counted, besides some dry sandbanks, the largest rocks appearing about the size of boats under sail. There are several swashways between the reefs, with apparently deep water. Remnants of other wrecks appeared bedded in the sand.

A rock, with depths of less than 6 feet (1<sup>m</sup>8) over it, named Bisson, is charted about 18 miles northward of Geyser reef, but its existence is doubtful.

In 1882, the whaler *Borneo* was wrecked on a reef, which was reported to lie in lat. 12° 11' S., long. 46° 24' E., but its existence is doubtful; it is now charted in lat. 12° 14' S., long. 46° 10' E. Lieutenant Charles T. Groves, R.N.R., Master of the s.s. *Sheaf Mount*, reported passing over the charted position of the Borneo reef, in August, 1922, and that he saw no signs of any reef in the vicinity.

In 1831, the whaling barque *Rover* saw a reef and described it as extending about 10 miles east-south-eastward and west-north-westward, of which 4 or 5 miles were uncovered at half ebb and the other parts were conspicuous by high breakers; this vessel considered the reef to be some 3 or 4 miles westward of the charted position of Geyser reef.

From the similarity of the descriptions of these reefs by their discoverers, and in accordance with the opinion of H.M.S. *Geyser*, it is thought more than probable that the dangers reported by the *Firebrass*, *Borneo*, *Rover*, and *Bisson* are none other than the Geyser reef, and that there are no dangers beyond the known limits of that reef (Lat. 12° 23' S., Long. 46° 25' E.). This assumption, however, has not yet been proved, and for the present the reported positions of these shoals are retained on the charts, awaiting further examination; pending which caution is necessary in this vicinity.

**Caution.**—The neighbourhood of Geyser reef is the most dangerous part of the Mozambique channel. In fine weather, at high tide, and with smooth water, when the sea does not break, there is, even by day, but little warning of the near approach to this reef, except by a good look-out and by careful sounding; on the northern side of the reef, it is uncertain whether sounding will give any warning of its proximity. Being also on the southern verge of the great west-going current, it is sometimes included in the course of that stream, but more frequently a counter north-east-going current prevails.

**Banc de la Zélée.**—Banc de la Zélée, with a least depth of 5½ fathoms (10<sup>m</sup>1) over it, lies on the same bank as Geyser reef and about 5½ miles south-westward of the reef; in 1910, the British s.s. *Zamora* reported having passed over discoloured water about 5 miles northward of the charted position of the western end of Banc de la Zélée.

*Charts 2762, 597, 748a, 748b.*

*Charts 759a, 597.*

**ISLAND AND BANKS IN CENTRAL PART OF MOZAMBIQUE CHANNEL.—Ile Juan de Nova.—Beacon.—Dangers.**

Juan de Nova, a sandy island, about 15 feet (4<sup>m</sup>6) high, lying about 280 miles south-south-westward of Ile Mayotte and 75 miles from the western coast of Madagascar, is a French possession. 5

*Chart 759a.*

Juan de Nova is covered with trees, especially at its eastern end, and can be seen from a distance of about 10 miles. The red-roofed house of the Director of the Guano company is conspicuous, as are the other buildings connected with the industry; a flagstaff stands near the centre of the northern side of the island, and there is a plantation of coconut trees about the middle of the island. 10

A beacon, surmounted, by a triangle, stands on Juan de Nova, near the centre of the island. 15

Juan de Nova lies on a sand and coral bank, which was reported, in 1943, to extend about 4 miles southward of the island, and the bottom of which shows up in white patches of sand and black coral heads; the southern side of this bank is steep-to, but shallow water, with depths under 5 fathoms (9<sup>m</sup>1), extends as far as 2½ miles northward of the island. 20

A conspicuous stranded wreck is situated on the sand and coral bank, north-westward of the island; in 1943, her funnel, painted yellow with a black top, and her masts, were visible. There are numerous wrecks on this bank, southward of the island. 25

There are numerous sea birds. Fish are plentiful. A small amount of maize is cultivated.

**Currents.**—The currents in the vicinity of Juan de Nova are strong and irregular. In 1943, a current setting north-eastward at a rate of 4½ knots was experienced. 30

The s.s. *Empire Envoy*, in 1945, experienced a northerly current, with a rate of about 1½ knots, between Juan de Nova and a position about 80 miles northward of that island; she also experienced a northerly set, attaining a rate of about 2 knots, between Juan de Nova and a position about 60 miles southward. 35

Mariners are warned to exercise caution.

**Wharf.**—A wharf, from which guano is shipped, extends from about the middle of the northern side of Juan de Nova (*Lat.* 17° 05' S., *Long.* 42° 43' E.).

**Anchorage.—Dangers.—Directions.**—It was reported, in 1937, that anchorage could be obtained about 2 miles off the wharf, in a depth of about 40 feet (12<sup>m</sup>2), sand and coral, or in a restricted berth, about a mile off the wharf, in a depth of about 35 feet (10<sup>m</sup>7). 40

Juan de Nova should be approached from northward and in daylight only. A clump of casuarinas should be steered for, bearing 185°, and when the flagstaff on the northern end of the island is in line with the beacon, surmounted by a triangle, bearing about 181°, this transit should be held, which leads to the anchorages mentioned above. 45

The anchorages are encumbered with shoals, having a least depth of 1½ fathoms (2<sup>m</sup>3) over them; these shoals can easily be seen, and care must be taken to avoid dropping the anchor on a coral head. Local knowledge is essential. 50

A vessel passing on either side of Juan de Nova should give the eastern and western extremities of the island a berth of at least 4 miles.

*Charts 597, 748a.*

*Chart 759a.*

Landing can be effected from fishing boats, which shelter in a small creek on the eastern side of the island; the fishing boats remain at Juan de Nova from July to February.

- 5 **Banks southward of Juan de Nova.**—A shoal may exist about 30 miles southward of Juan de Nova, in about lat.  $17^{\circ} 35' S.$ , long.  $42^{\circ} 42' E.$ , where the *Fabert* reported, in 1879, being struck by a heavy sea in moderate weather.

*Chart 597.*

- 10 A bank, with a depth of 10 fathoms ( $18^{m3}$ ) over it, lies about 70 miles south-south-westward of Juan de Nova, and a bank, with a least depth of 24 fathoms ( $43^{m9}$ ) was reported, in 1906, to lie about 96 miles south-westward of the same island; the position of the latter bank was indicated by discoloured water and overfalls.

- 15 A bank, with a depth of 100 fathoms ( $182^{m9}$ ), extending for about 6 miles, was reported, in 1944, to lie about 110 miles south-south-westward of Juan de Nova; this bank has not been examined.

*Chart 759a.*

- Bajo de Vinès, a shoal, discovered, in 1871, by the *Rasa de Juria*,  
20 lies about 110 miles southward of Juan de Nova, and 65 miles from the coast of Madagascar. When first seen it bore about  $238^{\circ}$ , distant  $1\frac{1}{2}$  miles, and the vessel was in depths of 41 fathoms ( $75^{m0}$ ), sand and shells. At a distance of 5 cables there were depths of  $3\frac{1}{2}$  fathoms ( $6^{m9}$ ), coarse sand; at a distance of half a cable all round there were  
25 depths of  $1\frac{1}{2}$  fathoms ( $3^{m2}$ ). A party landed and found the diameter to be 14 yards ( $12^{m8}$ ), and that it dried 2 feet ( $0^{m6}$ ).

*Chart 596.*

- ISLAND AND REEFS IN SOUTHERN PART OF MOZAMBIQUE CHANNEL.**—**Pilot shoal.**—This shoal was reported, in  
30 1850, by Captain White, of the American whaling barque *Pilot*, as being in lat.  $21^{\circ} 10' S.$ , long.  $38^{\circ} 57\frac{1}{2}' E.$  At 0730 on January 5th, the vessel passed over the end of a shoal, with, as it was assumed, depths of not more than 3 fathoms ( $5^{m5}$ ) over it, as the bottom was distinctly seen; at the same time several patches to windward were  
35 observed, which looked nearer the surface; the whole extent of the shoal was estimated to be from  $1\frac{1}{2}$  to 2 miles, and it was said to lie  $295^{\circ}$  (*by compass*) distant 35 miles from Bassas da India, which, however, does not agree with the latitude and longitude given by Captain White.

- 40 Assuming that  $295^{\circ}$  (*true*), distant 35 miles, from Bassas da India, was meant, an unsuccessful search, extending over a period of 4 days, was made by Commander Wharton in February, 1878. The weather was favourable and the water clear, but no soundings could be obtained on the reported position of the shoal, nor within the distances of from  
45 5 to 15 miles on all sides, nor could any sign of shoal water be seen from the masthead. A depth of 1,620 fathoms ( $2962^{m7}$ ), grey mud, was obtained 3 miles south-eastward of the alleged position of the shoal.

- Many vessels have passed over this alleged position, but none has succeeded in finding the shoal. The latest recorded is H.M.S. *Pearl*,  
50 in September, 1904; she took several casts with the sounding machine, but found no bottom at 100 fathoms ( $182^{m9}$ ), and saw no signs of shoal water.

**Bassas da India.**—Bassas da India, sometimes called Europa

*Charts 597, 748a.*

*Chart 596.*

rocks or Baxos da India, were discovered by the *Europa*, in 1774. The reef was examined, in 1878, by H.M. Surveying ship *Fawn*, whose observations place the eastern extremity of the reef in lat.  $21^{\circ} 27\frac{1}{2}'$  S., long.  $39^{\circ} 45\frac{1}{2}'$  E. 5

Bassas da India is a circular coral reef, about 6 miles in diameter, enclosing a shallow lagoon; there are some small rocks, from 7 to 10 feet ( $2^m1$  to  $3^m0$ ) high, on the northern and eastern sides of the reef; the western and southern sides dry 4 feet ( $1^m2$ ), and most of the remainder dries also. The reef is steep-to, depths of 720 fathoms ( $1,316^m7$ ), sand, were found about a mile from the western side of the reef; 470 fathoms ( $859^m5$ ), sand, a mile from the northern side; and 200 fathoms ( $365^m7$ ) 7 or 8 cables from the southern side. The sea breaks heavily over the reef, which may be seen from a vessel's masthead, in clear weather, from a distance of about 10 miles. 15

A pass, apparently practicable for boats, at high water, appears to exist on the eastern side of the reef. The waters of the lagoon are of a characteristic bright green colour, contrasting strongly with the deep blue of that outside. There is no anchorage anywhere round this reef.

The currents in the vicinity of Bassas da India appear to be strong. 20

**Ile Europa.**—Ile Europa, lying about 60 miles south-eastward of Bassas da India and 150 miles from the western coast of Madagascar, is a French possession.

Ile Europa (Lat.  $22^{\circ} 20'$  S., Long.  $40^{\circ} 26'$  E.), which is very difficult to distinguish at night, is composed chiefly of sand, with low hummocks 25 in places; it is partly covered with bushes, and there are some trees, attaining an elevation of 46 feet ( $14^m0$ ). Pointe Nord-Ouest, the north-western point of the island, from 7 to 10 feet ( $2^m1$  to  $3^m0$ ) high, is sandy, and has some bushes on it. A lagoon penetrates the north-eastern part of the island. 30

The western side of the island is rocky and appears to be steep-to; the eastern side consists of low steep cliffs, and also appears to be steep-to; the southern side is low.

A coral reef, which dries, fringes the northern side of Ile Europa, extending as far as half a mile offshore; the edge of this reef appears 35 to be steep-to. About one cable farther seaward is a bank, with a least depth of 11 fathoms ( $20^m1$ ) over it, extending about  $1\frac{1}{2}$  miles eastward and westward.

The north-eastern coast of Ile Europa is fringed by a reef, and beyond it are depths of from 12 to 18 fathoms ( $21^m9$  to  $32^m9$ ). 40

It is reported that the southern coast of this island is fringed by a reef which extends one mile or more offshore, but this information is doubtful. However, as this is usually a lee shore, it should be given a wide berth.

Approaching Ile Europa from north-westward, in 1900, H.M.S. 45 *Thrush* found depths of from 85 to over 100 fathoms ( $155^m4$  to over  $182^m9$ ), from 2 to 3 miles offshore. Off the northern side of the island H.M.S. *Penguin* found depths of 11 fathoms ( $20^m1$ ), and the bottom was visible 3 miles offshore.

Landing may be effected in moderate weather on a small beach at 60 the north-western extremity of the island, and also between the rocks on the western side.

Cyclones are reported to visit this island occasionally.

Ile Europa was inhabited, in 1936.

*Chart 748a.*



*Chart 596.*

**Currents.**—In November, 1875, H.M.S. *Flying Fish* found a current setting north-westward at a rate of from 2 to  $2\frac{1}{2}$  knots, causing ripples, eddies, and in some places almost a race. The current in this vicinity is very variable, both in direction and rate, rendering constant observations necessary to check the vessel's position.

In 1921 the *Bellatrix* found a north-going current, with a rate of nearly one knot.

**Anchorage.**—There is no safe anchorage; vessels may anchor on the edge of the coral reef to leeward of the island, but without room to swing in case of a shift of wind. There is a berth, in depths of from  $6\frac{1}{2}$  to 10 fathoms ( $11^m9$  to  $18^m3$ ), close southward of the north-western extremity of the island, but it is in proximity to a dangerous head. There is also anchorage, in depths of from 12 to 16 fathoms ( $21^m9$  to  $29^m3$ ), about a cable from the reef bordering the northern extremity of the island. These anchorages are precarious, and a vessel using them should be prepared to weigh at any time.

**SLOT VAN CAPELLE.**—The existence of this bank, as well as its position, is considered doubtful, but it is shown on the chart in *lat. 36° 34' S. long. 41° 20' E.*; it is named after the Dutch vessel by which it was reported, in 1748, which vessel stated it to be of considerable dimensions and obtained soundings in 63 fathoms ( $115^m2$ ) south-westward of it. The bank was again seen by the *Automatia*, in 1801, and by Captain Vian of the *Jacques-Elizabeth*, in 1856.

*Chart 748a.*

## CHAPTER VI

MADAGASCAR, NORTH-WESTERN COAST—CAP D'AMBRE TO POINTE  
D'ANGADOKA*Chart 758.*

**OUTER REEF.**—Between Cap d'Ambre (Amber), the northern extremity of Madagascar, and Cap Saint-André (*Lat.* 16° 11' S., *Long.* 44° 28' E.), about 400 miles south-westward, the coast is bordered by a bank, with depths of less than 50 fathoms (91<sup>m</sup>4), extending from 5 to 15 miles offshore, except off Cap Saint-André, where it extends off nearly 40 miles. This bank at its outer edge is steep-to and slopes steeply into great depths, so that vessels drawing more than 13 feet (4<sup>m</sup>0) should be navigated with great care when approaching it, as in some places there are depths of 16 or 17 feet (4<sup>m</sup>9 or 5<sup>m</sup>2) over the flats and heads of coral, which flats are often of great extent and lie most frequently on the outer edge of the bank. It may be considered certain that, from the nature of this bank and the adjacent coast, there may be many dangers other than those shown on the chart. Constant sounding and a good look-out from the mast-head to give notice of any change of colour of the water, are essential when navigating off this coast.

**LOCAL WEATHER.** See pages 48-51.

*Chart 1002.*

**COAST.**—**Aspect.**—From Cap d'Ambre the coast, which is uninhabited, trends about 14 miles south-westward to Cap Voailava, and is indented by three large inlets, Baie Lotsoïna, Baie Ampanasina, and Baie Ambavanibé, where vessels can obtain secure anchorage. A few small fishing boats may occasionally be seen off this part of the coast.

*Charts 1002, 758.*

Montagne d'Ambre (Mount Amber), situated about 40 miles southward of Cap d'Ambre, is the highest and most conspicuous mountain near the northern extremity of Madagascar; it rises regularly to an elevation of 4,852 feet (1,478<sup>m</sup>9), and its sides are covered with thick forest. In moderately clear weather it is seen long before the intervening land.

*Chart 1002.*

Andramaimbo, about 17 miles south-south-westward of Cap d'Ambre, is a conspicuous conical mountain, 1,303 feet (397<sup>m</sup>1) high, with a flagstaff on its summit, rising from a level ridge, and can be seen from a long distance eastward or westward; from eastward it has the shape of a mitre. This mountain is sometimes called Windsor Castle.

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 1002.*

Ankaramisampana, sometimes called Dover Castle, is a conspicuous hill, 955 feet (291<sup>m1</sup>) high, on the same ridge as Andramaimbo and about 2 miles eastward of it.

5 *See view A on chart.*

The coasts of the peninsula, of which Cap d'Ambre is the northern extremity, are coral, but the country generally is volcanic, forming irregular hills from 500 to 900 feet (152<sup>m4</sup> to 274<sup>m3</sup>) high, covered with long grass, which in October, when seen from a distance, looks like  
10 sand. The valleys are generally marshy, and covered with a prickly green grass. Mangrove swamps are few and of small extent. The climate is pleasant on account of the cool south-easterly wind generally blowing.

From westward the land southward of Cap d'Ambre (*Lat. 11° 57' S.,*  
15 *Long. 49° 18' E.*) presents a broken irregular outline, having numerous hills and hummocks with bare sides, and summits covered with grass. Ambinantsandra, 948 feet (289<sup>m0</sup>) high, about 7½ miles south-south-westward of Cap d'Ambre, is broader and higher than the others and is covered with trees; a round dark hill near it also has trees on it, and  
20 both hills may be identified by their dark colour. Le Coq, or Ambohi-trakoholahi, a peak, 909 feet (277<sup>m1</sup>) high, about 2 miles eastward of Ambinantsandra, is not conspicuous from north-westward, being shut in by the latter, but it shows well from south-westward and, from that direction, is a useful leading mark.

25 **Tidal streams.**—From a position a little westward of Cap d'Ambre, observations were made for six days, in March, and it was found that the stream generally sets north-eastward and is at its maximum one hour after high water, attaining a rate of 2½ knots; the stream sets southward for one hour at the time of low water, its strength being half  
30 that of the northerly stream; the turn of the stream is almost instantaneous, there being no slack water.

**Currents.**—Off this part of the coast the combined current and tidal stream usually sets northward. On March 26th, 1906, a constant  
35 north-east-going stream was observed, except for about an hour towards low water, when there was a weak south-going stream; the maximum rate, 2½ knots, occurred one hour after high water.

A south-going current is sometimes caused by northerly winds. It may be said that the current often follows the direction of the wind, and sometimes even precedes its changes.

40 **Coast.—Dangers.**—Cap d'Ambre consists of three low rocky points, fringed by a reef, on which lies a number of above-water rocks; it is the termination of a large regular plain of moderate height; which has a brown parched appearance, and is visible from a distance of 15 or 20 miles.

45 To round Cap d'Ambre from westward requires care from April to November, the current then attaining, in conjunction with the tidal stream, a rate of from 3 to 4 knots, and at half flood it has been found to reach from 5 to 6 knots in one place; also the south-east monsoon often blows strongly, raising a short, choppy sea, but both current  
50 and sea are much reduced the nearer the cape is approached.

On the night of the 8th-9th April, 1920, H.M.S. *Odin* experienced the greatest difficulty in rounding Cap d'Ambre from westward. Although she was steaming 8 knots through the water, at one time the ship actually lost ground for half an hour, and for a longer period

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 1002.*

could make almost no headway at all. By closing the shore to within a few cables, sufficient headway was made to round the cape before daylight. The weather was normal, there being a moderate south-easterly breeze. Three tide-rips of considerable violence were passed 5 through.

This passage has frequently been made without difficulty by passing within 2 or 3 cables of the coastal reef.

*Charts 1054, plan of Baies Ambavanibé, Ampanasina and Lotsoina ; 1002.*

Baie Lotsoina, a landlocked inlet, the entrance to which lies about 4½ miles west-south-westward of Cap d'Ambre (*Lat. 11° 57' S., Long. 49° 18' E.*), affords good shelter to vessels waiting for a favourable opportunity to round Cap d'Ambre from westward; the entrance is not easy to identify from a distance, but shows up best from north- 15 north-westward or north-westward.

*Chart 1054, plan of Baies Ambavanibé, Ampanasina and Lotsoina.*

The shores of this bay are of uniform appearance, low, flat, and of coral formation, rising perpendicularly to an elevation of from 10 to 15 feet (3<sup>m</sup>0 to 4<sup>m</sup>6), and thickly covered with bushes. The hills in 20 the background are wooded.

The entrance is narrow, with a least depth of 5½ fathoms (10<sup>m</sup>1) in the fairway; the reefs on either side of the fairway are visible from aloft. A spit, with a depth of 1½ fathoms (3<sup>m</sup>2) at its edge, extends about one cable north-north-eastward of Pointe Mpaninabo, the south- 25 western entrance point; the edge of this spit should be marked, if possible, before entering the inlet. The best time for seeing these dangers is in the afternoon.

Baie Ampanasina, the entrance to which lies about 1½ miles south-westward of the entrance to Baie Lotsoina, closely resembles the 30 latter inlet; the shores of Baie Ampanasina are fringed with coral reefs and it would be advisable, before entering, to mark the projecting reefs. There is a least depth of 7 fathoms (12<sup>m</sup>8) in the fairway of the entrance, decreasing to 3½ fathoms (5<sup>m</sup>9) near its head.

Baie Ambavanibé, the largest of the three inlets indenting this 35 coast, is entered between Pointe Andranovondrony, about 2½ miles south-westward of the south-western entrance point of Baie Ampanasina, and Pointe Vedette, about 1½ miles farther south-westward. It can be identified by the wooded hills with which it is surrounded, one of which, Ambinantsandra (page 146), is typical; the shores of 40 this inlet are bordered with mangroves. See view B on chart 1002.

The reefs which fringe the shores of the bay dry in places, but are difficult to distinguish when they are covered or when the light is unfavourable. The reefs fringing the entrance points of this bay can be easily seen at half-tide, but they contract the navigable channel to 45 a width of about 1½ cables; Rocher Sentinelle, 8 feet (2<sup>m</sup>4) high, and Rocher Aiguille, 6 feet (1<sup>m</sup>8) high, lie on the coastal reef, on the south-western side of the entrance, about 2 cables north-eastward and 6½ cables eastward, respectively, of Pointe Vedette, and there are several other above-water rocks on this part of the coastal reef. 50

*Chart 1002.*

The coast between Pointe Vedette and Cap Voailava is fringed by a reef which dries and extends as far as one mile offshore. Nosy Pahanjy, lying on this reef, about half a mile west-north-westward of

*Charts 1002, 758, 2762, 597.*

*Chart 1002.*

Cap Voailava, is a rocky islet, 25 feet (7<sup>m</sup>6) high ; a detached rock, 11 feet (3<sup>m</sup>4) high, lies close off its northern end.

Cap Voailava is a low-lying promontory composed of yellow sand.

5 *Chart 1054, plan of Baies Ambavanibé, Ampanasina and Lotsoïna.*

**Anchorage.**—**Tidal streams.**—**Directions.**—Vessels can obtain anchorage off the entrance to Baie Lotsoïna (*Lat.* 11° 59' S., *Long.* 49° 13' E.) in depths of from 11 to 12 fathoms (20<sup>m</sup>1 to 21<sup>m</sup>9), mud, but the proximity of the coastal reef renders it necessary to be ready  
10 to weigh anchor if the wind blows onshore.

As already stated, the anchorages within Baie Lotsoïna are land-locked, but they are, however, swept by violent off-shore squalls.

The flood stream sets very strongly west-south-westward across the entrance to Baie Lotsoïna, and care is necessary in entering the channel,  
15 but when fairly entered the stream follows the channel.

On the south-western side of this inlet, on the coastal reef, lies an islet, covered with bushes, about 1½ miles south-eastward of Pointe Mpaninabo, and vessels can obtain anchorage with this islet bearing 220°, in depths of 7½ fathoms (13<sup>m</sup>7), mud, good holding ground ;  
20 vessels can also obtain anchorage in the basin north-westward of the islet.

When leaving Baie Lotsoïna it is better to leave in the early hours of the morning, before the breeze has got up, and it is advisable to mark the projecting points of the coastal reef as the light is then  
25 bad.

A vessel without local knowledge should not attempt to enter Baie Ambavanibé without having previously marked the dangers. During the south-east monsoon there are strong south-easterly squalls which, when meeting the tidal stream flowing in an opposite direction, causes  
30 breakers across the entrance and prevents the edges of the coastal reef being seen ; under these circumstances the best time for entering or leaving is the early morning while the breeze is light, and also before the sun is above the hills, as later it is more difficult to discern the coastal reefs on the north-eastern side of the inlet.

35 The tidal streams attain rates of from 2 to 3 knots at springs, and care must be taken when entering or leaving.

Ambinantsandra, bearing 112°, leads towards the entrance to Baie Ambavanibé. A vessel must pass not less than 6 cables from Rocher Sentinelle, and steer into the inlet with Le Ballon, a hill, 150 feet  
40 (45<sup>m</sup>7) high, about one mile south-south-westward of Ambinantsandra, in line with l'Ablette, a hill, 363 feet (110<sup>m</sup>6) high, about 1½ miles south-eastward of Le Ballon, bearing 128° ; when Rocher Sentinelle bears about 230° and is just open north-westward of Pointe Vedette a vessel should bear a little southward so as to avoid the coastal reef  
45 on the north-eastern side of the entrance. When Rocher Aiguille bears about 262° and is just open northward of Pointe Vedette it is necessary to bear sharply eastward to avoid the coastal reef on the south-western side of the channel.

After passing north-eastward of this projecting point of the coastal  
50 reef a vessel should steer south-eastward in mid-channel until Ambinantsandra bears 090°, when Sommet Tirailleuse, 363 feet (110<sup>m</sup>6) high, at the head of the inlet, bearing 147°, leads to the anchorage.

The best anchorage during the south-east monsoon is, in depths

*Charts 1002, 758, 2762, 597.*

*Chart 1054, plan of Baies Ambavanibé, Ampanasina and Lotsoina.* of about 8 fathoms (14<sup>m</sup>6), mud, under the lee of Sommet Tirailleuse (Lat. 12° 06' S., Long. 49° 13' E.).

The wind at the anchorage is strong at this season, and squalls blow down the side of the hills raising a choppy sea and causing 5 vessels to drag their anchors.

*Chart 1002.*

**Coast.—General remarks.**—Between Cap Voailava and Cap St. Sébastien, the north-western extremity of Presqu'île d'Orontany, about 26 miles south-westward, the coast is deeply indented and forms 10 Baie Andramaimba (William Pitt or Andramahiba bay) and Baie de Befotaka; these two bays, particularly the former, are encumbered with islets and reefs, which extend as much as 13 miles from the coast.

Baie Andramaimba is entered between Cap Voailava and Pointe Baron, about 17½ miles south-south-westward; the shores of this bay 15 are indented by a number of smaller bays, of which the principal ones are named Antsantsa, Amponkarana, du Courrier, and d'Ambararata.

From seaward the principal landmarks are Andramaimbo and Ankaramisampana; see pages 145-146.

A chain of islands and reefs extending from Cap Voailava to Pointe 20 Baron, divides Baie Andramaimba into an outer and inner roadstead. These coral reefs are mostly covered, but those further seaward sometimes dry, and then appear to have a yellowish colour; small detached rocks are more dangerous as they do not dry and sounding does not give warning of their proximity. Contrary to the reefs furthest sea- 25 ward, which can be discerned on account of the green water over them contrasting with the blue water in the vicinity, the inner reefs cannot be seen when they are covered.

Strong south-easterly breezes cause a choppy sea, but it does not break over the reefs, nor even cause eddies except near low water, 30 consequently a good look-out is necessary.

Between these reefs are several passes giving access to the inner roadstead.

Baie de Befotaka, which is entered between Pointe Baron and the north-eastern extremity of Presqu'île d'Orontany, about 6½ miles 35 west-south-westward, is easier of access than Baie Andramaimba.

**Tidal streams.**—The tidal streams in this neighbourhood are irregular. The flood stream generally sets south-westward and the ebb stream north-eastward; they are sometimes very strong and cause eddies in the channels about Nosy Hao, which lies about 2 miles 40 westward of Cap Voailava. When there is a fresh breeze at Pointe Mandoava, the south-western extremity of Cap St. Sébastien, the sea becomes covered with foam as though there were breakers in the channels.

**Outer islets and dangers.**—The outer chain of islets and dangers 45 extends from Cap Voailava to Nosy Anambo, about 12½ miles west-south-westward.

Nosy Hao, 33 feet (10<sup>m</sup>1) high, is flat, rocky, and partly covered with bushes; it lies on a reef which dries 5 feet (1<sup>m</sup>5) and extends about three-quarters of a mile northward and 1½ miles south-eastward of it. 50

Nosy Vaha (Lat. 12° 08' S., Long. 48° 59' E.), about 3½ miles westward of Nosy Hao, is 21 feet (6<sup>m</sup>4) high, flat, bare, and fringed by a reef; a rock, 8 feet (2<sup>m</sup>4) high, lies close off its south-western side. A bank, with a least depth of three-quarters of a fathom (1<sup>m</sup>4) over it,

*Chart 1002.*

extends from the north-eastern side of the reef fringing Nosy Vaha north-eastward to within a short distance of the bank extending westward of the north-western extremity of the reef on which lies Nosy Hao.

- 5 Nosy Fasy, lying about  $6\frac{1}{2}$  miles west-south-westward of Nosy Vaha, dries about  $1\frac{1}{2}$  feet ( $0^m5$ ), and is difficult to see, except when the sea breaks over it.

Nosy Faty, about  $5\frac{1}{2}$  miles westward of Nosy Fasy, is a shallow bank, on the centre part of which is a sandbank which dries; on this sand-  
10 bank lies a rock, 11 feet ( $3^m4$ ) high. Nosy Faty can be identified by the whiteness of the sandbank, except at high water.

Nosy Anambo, lying about  $9\frac{1}{2}$  miles west-south-westward of Nosy Fasy, is an islet composed of sand and coral, on which stand some casuarina trees and stunted undergrowth; there is some guano on its  
15 north-eastern point. A reef, which extends about  $3\frac{1}{2}$  cables northward and eastward of it, fringes this islet; a wreck, in 1944, marked the south-eastern extremity of this reef. There is a swell here and landing is only possible in fine weather.

A 4-fathom ( $7^m3$ ) patch lies within the western edge of the bank  
20 of soundings, and about  $9\frac{1}{2}$  miles south-westward of Nosy Anambo. In 1864, the French man of war *Licorne* anchored, in depths of  $8\frac{1}{2}$  fathoms ( $16^m0$ ), about 3 miles north-westward of this 4-fathom ( $7^m3$ ) patch.

*Chart 758.*

25 Banc Intermédiaire (Intermediate bank), with depths of about 20 fathoms ( $36^m6$ ) over it, and of some considerable extent, lies about  $16\frac{1}{2}$  miles south-westward of Nosy Anambo, and is outside the outer edge of the coastal bank.

*Chart 1002.*

- 30 **Light.**—A light is exhibited, at an elevation of 39 feet ( $11^m9$ ), from a white, circular, iron tower, 43 feet ( $13^m1$ ) in height, situated on Nosy Anambo.

**Current.**—The current near Nosy Anambo sometimes attains a rate of from 2 to 5 knots.

- 35 **Anchorage.**—In 1921, the *Bellatrix* anchored, in depths of 6 fathoms ( $11^m0$ ), about 5 cables southward of Nosy Anambo lighthouse.

**Outer roadstead.—Anchorages.**—Vessels can find good anchorage within the triangle formed by Nosy Vaha, Nosy Fasy, and Nosy Hara, about  $5\frac{1}{2}$  miles south-south-eastward of Nosy Vaha, in depths of from  
40 about 5 to 10 fathoms ( $9^m1$  to  $18^m3$ ), sand and coral; in depths of over 11 fathoms ( $20^m1$ ) the bottom is sand and mud or only mud.

In anchoring in the western part of this anchorage, vessels must be careful to avoid the deep gully which lies eastward and south-eastward of Nosy Fasy (*Lat.*  $12^\circ 10' S.$ , *Long.*  $48^\circ 54' E.$ ), where the tidal  
45 streams are, at times, very strong, the holding ground bad, and the sea rough during the south-east monsoon.

There is good anchorage in depths of 11 fathoms ( $20^m1$ ), under the shelter of the western coast of Nosy Hara, with Nosy Belomotro, about one mile westward of the southern end of Nosy Hara, in line with Nosy  
50 Lakandava, about one mile west-south-westward of Nosy Belomotro, bearing about  $250^\circ$ , and Le Lion, about  $1\frac{1}{2}$  miles south-south-westward of Nosy Hara, bearing  $188^\circ$ .

**Directions.**—A vessel approaching from northward may proceed through Passe de la Rance, westward of Nosy Hao, or westward of  
55 Nosy Vaha.

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 1002.*

Passe de la Rance, westward of Nosy Hao, should only be used by vessels of moderate draught. A vessel using this channel should steer with the eastern extremity of Nosy Mavony, an above-water rock about  $1\frac{1}{2}$  miles south-south-westward of Nosy Hao, in line with Ankiti- 5 kona, a conspicuous densely wooded peak, 876 feet (267<sup>m</sup>0) high, about  $11\frac{1}{2}$  miles south-south-eastward, bearing  $165^\circ$ , which leads through the fairway in a least depth of  $3\frac{1}{2}$  fathoms (6<sup>m</sup>4), passing close westward of a  $3\frac{1}{2}$ -fathom (5<sup>m</sup>9) patch about  $2\frac{1}{2}$  miles north-north-westward of Nosy Mavony. 10

*Charts 1002, 758.*

A vessel approaching from northward can pass westward of Nosy Vaha. When this islet bears about  $140^\circ$  she should bring the western extremity of Nosy Lakandava in line with Le Diable, a conspicuous 15 mountain, 1,316 feet (401<sup>m</sup>1) high, about 25 miles southward, bearing  $185^\circ$ , which leads about one mile westward of Nosy Vaha in a least depth of 5 fathoms (9<sup>m</sup>1). Should Le Diable be obscured, which is often the case, Nosy Foty, about  $3\frac{1}{2}$  miles southward of Nosy Vaha, in line with Nosy Antanalovo, about  $1\frac{1}{2}$  miles westward of the northern 20 part of Nosy Hara, bearing  $171^\circ$ , leads through this channel.

*Chart 1002.*

If bound for the anchorage, off the western side of Nosy Hara a vessel, when inside Passe de la Rance, should steer with Ambatobé, a hill, 848 feet (258<sup>m</sup>5) high, about 14 miles south-south-westward of Nosy 25 Lakandava, bearing  $206^\circ$ , open north-westward of Nosy Antanalovo, until westward of the latter islet when course may be altered eastward towards the anchorage bringing Le Lion to bear  $188^\circ$ .

A shallow bank extends from eastward of Nosy Vaha to within about  $1\frac{1}{2}$  miles north-eastward of Nosy Foty.

A vessel approaching the outer roadstead from southward should, 30 after having rounded Cap St. Sébastien, if passing westward of Nosy Foty, steer for Nosy Vaha, bearing  $042^\circ$ , but if intending to pass eastward of Nosy Foty steer with the north-western extremity of Nosy Antanalovo in line with Ambatoarara, a hill, with a rounded summit, 633 feet (192<sup>m</sup>9) high, partly covered with trees, situated about  $11\frac{1}{2}$  35 miles east-north-eastward, bearing  $061^\circ$ .

Care must be taken to avoid the shoals, with a least depth of  $1\frac{1}{2}$  fathoms (2<sup>m</sup>7) over them, on the south-eastern side of the fairway, lying within about 7 miles north-eastward of Cap St. Sébastien (*Lat.* 12° 25' S., *Long.* 48° 46' E.); care must also be taken to avoid a shoal, 40 with a depth of  $4\frac{1}{2}$  fathoms (7<sup>m</sup>8) over it, lying about 4 miles further north-eastward, also a detached shoal, with a depth of 4 fathoms (7<sup>m</sup>3), lying about 4 miles westward of Nosy Antanalovo.

**Inner islands and dangers.**—This chain of islands and dangers, extending in a general south-westerly direction from Cap Voailava, 45 separates the inner and outer roadsteads; only the principal dangers are described below.

Nosy Mavony, 95 feet (29<sup>m</sup>0) high, fringed by a reef, lies about  $1\frac{1}{2}$  miles south-south-westward of Nosy Hao.

Nosy Foty, 18 feet (5<sup>m</sup>5) high, lying about  $4\frac{1}{2}$  miles south-westward 50 of Nosy Mavony, is a flat islet, covered with brushwood, and fringed by a beach which renders it conspicuous in bright weather; it is surrounded by a reef which rises from a sandy bottom and shows plainly.

A chain of reefs and rocks lies between Nosy Mavony and Nosy Hara,

*Charts 758, 2762, 597, 748a, 748b.*



*Chart 1002.*

about 5 miles south-south-westward; these dangers lie on a shallow bank, and there may be other detached rocks than those charted. No vessel should attempt to pass between these reefs.

- 5 Nosy Hara, the largest of these islands, is composed of basaltic rocks, and its north-eastern extremity, a large rock, 343 feet (104<sup>m</sup>5) high, appears from a distance to be a detached islet but is connected with the main island by a sandy isthmus; the cliffs of Nosy Hara, except at its southern extremity, where it attains an elevation of 413 feet (125<sup>m</sup>9),  
10 are steep and inaccessible.

Nosy Antanalovo, 108 feet (32<sup>m</sup>9) high, about 1½ miles westward of the northern part of Nosy Hara, lies on a shallow bank, and is fringed by a reef on its northern and north-eastern sides.

- Nosy Belomotro, 98 feet (29<sup>m</sup>9) high, about one mile south-south-  
15 westward of Nosy Antanalovo, is steep-to; it is indented, and its coasts consist of steep cliffs.

- Nosy Lakandava, 187 feet (57<sup>m</sup>0) high, lying about one mile westward of Nosy Belomotro, has steep cliffs on its western side, and is fringed on its eastern side by a reef; a shoal, with a depth of 2½ fathoms  
20 (5<sup>m</sup>0) over it, lies about half a mile south-south-eastward of Nosy Lakandava.

Nosy Ambatorangitsy, 121 feet (36<sup>m</sup>9) high, lying between Nosy Lakandava and Nosy Belomotro, has a reef extending about a quarter of a mile north-westward of it.

- 25 Nosy Anjombavola, 295 feet (89<sup>m</sup>9) high, which has a very rugged appearance, is the largest of a group of islets lying within about 1½ miles eastward and 2 miles east-south-eastward of Nosy Lakandava; Nosy Andantsara, 171 feet (52<sup>m</sup>1) high, lies at the western end of a bank extending about half a mile westward of Nosy Anjombavola; Nosy  
30 Mely, 115 feet (35<sup>m</sup>0) high, the southernmost of this group, about three-quarters of a mile southward of Nosy Anjombavola, has a conspicuous detached granite block, 69 feet (21<sup>m</sup>0) high, close southward of it; Le Lion, a rock 46 feet (14<sup>m</sup>0) high, lies about half a mile east-north-eastward of Nosy Mely, and two shoals, each with a depth of 4½ fathoms  
35 (7<sup>m</sup>8) over it, lie about a quarter of a mile and three-quarters of a mile, respectively, south-south-eastward of the same islet.

- Grand Récif (Great reef), which dries, lying about 2 miles west-south-westward of Nosy Mely (*Lat.* 12° 17' S., *Long.* 49° 00' E.), together with the detached rocks and shoals northward and southward  
40 of it, form the southern end of the chain of inner islands and dangers separating the two roadsteads.

- Channels.—Islets and dangers.—Directions.**—Passe de Nosy Hao, between Cap Voailava and Nosy Hao, avoids the outer and inner chains of islands and reefs, but it is not recommended as the channel is  
45 narrow and tortuous, the tidal streams are strong, the reefs are difficult to discern at high water, there are no good landmarks, and a vessel cannot anchor in case of necessity.

- Small vessels with local knowledge can use this pass at low water, steering with Nosy Famaho, an islet about 6½ miles southward of Nosy  
50 Hao, bearing 181°, until Nosy Mpay, an islet about 3½ miles eastward of the southern end of Nosy Hao, is in line with Ambatoarara, about 2½ miles eastward of Nosy Mpay, bearing 098°, when a vessel can alter course eastward for an anchorage in the inner roadstead.

Nosy Mpay, 17 feet (5<sup>m</sup>2) high, is fringed by a reef, on which lie some

*Charts 758, 2762, 597.*

*Chart 1002.*

small above-water rocks; a shoal, with a depth of  $3\frac{1}{2}$  fathoms ( $6^m4$ ) over it, lies about 6 cables northward of this islet, and some shoals, the positions of which can best be seen on the chart, lie between Nosy Mpay and the mainland eastward. 5

Between Nosy Mpay and the southern entrance to the pass just described there are several detached shoals, the positions of which can best be seen on the chart.

A vessel from northward having entered the outer roadstead can proceed to the inner roadstead by one of the two following channels. 10

The channel between Nosy Hara and Nosy Anjombavola is deep and free from dangers.

The channel between Nosy Lakandava and Grand Récif is also deep, and is free from dangers with the exception of the shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $5^m0$ ), half a mile south-south-eastward of Nosy Lakandava; 15  
Le Lion in line with La Selle, a hill, 489 feet ( $149^m0$ ) high, about  $9\frac{1}{2}$  miles eastward, leads close southward of this shoal.

There are two channels suitable for vessels, drawing not more than 18 feet ( $5^m5$ ), with local knowledge, viz., Passe Nord (North pass) or Passe du Capricorne. 20

Passe Nord leads close southward of the reef extending south-eastward of Nosy Hao, and could be used by a vessel having passed through Passe de la Rance. Les Cristaux, an islet, 31 feet ( $9^m4$ ) high, which is steep-to and is composed of two masses of rock joined at their base, lying about 6 miles south-eastward of the south-eastern end of Nosy Hao, bearing  $117^\circ$  and just open north-eastward of a small elongated wood on the north-eastern spur of Andramaimbo, leads through the western part, and the above-water rock close off the south-western side of Nosy Vaha, astern, bearing  $278^\circ$ , and open northward of the northern extremity of Nosy Mavony, leads through the eastern part of 30  
this channel, in a least depth of  $3\frac{1}{2}$  fathoms ( $6^m4$ ).

A rock, with a depth of  $2\frac{1}{2}$  feet ( $0^m8$ ) over it, which shows well at low water, lies on the southern side of the western part of this channel, about three-quarters of a mile eastward of Nosy Mavony (*Lat.*  $12^\circ 09' S.$ , *Long.*  $49^\circ 03' E.$ ). 35

When through Passe Nord, Les Cristaux in line with Andramaimbo, bearing  $124^\circ$ , leads between Récif Est (East reef) and Récif de la Fosse.

From southward a small vessel may pass south-eastward of Nosy Mavony into Passe Nord with Nosy Mpay in line with Ambohibiri or La Poule, a conspicuous hill, 771 feet ( $235^m0$ ) high, about 11 miles east-north-eastward, bearing  $074^\circ$ , until Les Cristaux is in line with the wood on the north-eastern spur of Andramaimbo, when she should proceed as directed above.

Récif Est, lying with its northern extremity about  $1\frac{1}{2}$  miles south-south-westward of Cap Voailava, extends about  $1\frac{1}{2}$  miles south-south-eastward, and dries 2 feet ( $0^m6$ ); it should not be approached closely. Récif de la Fosse, the north-western extremity of which is situated about one mile southward of Récif Est, extends about half a mile south-eastward, and dries in parts. 45

Passe Sud (South pass), about three-quarters of a mile southward of 50  
Passe Nord, can only be used by small craft with local knowledge; Les Cristaux in line with a wooded bluff, 210 feet ( $64^m0$ ) high, about  $1\frac{1}{2}$  miles east-south-eastward, bearing  $110^\circ$ , leads through this pass in a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ), but there are less depths very close to this leading line. 55

*Charts 758, 2762, 597.*

*Chart 1002.*

Passe du Capricorne lies between the north-eastern extremity of Nosy Hara and Récif Double, about three-quarters of a mile north-eastward. A rounded rock, 42 feet (12<sup>m</sup>8) high, lying about 2 cables eastward of the western entrance point of Baie d'Ambararata, in line with Ankitikona, bearing 149°, leads through this passage in a least depth of 22 feet (6<sup>m</sup>7).

**Caution.**—In the absence of any beacons the passes which give access to the bay are not easy; the sea does not break over many of the dangers, and they are, therefore, difficult to see.

In a general way, and especially during the south-east monsoon, it is advisable when the vessel's draught admits, to make the passes about low water, as then the coral shows up well. When the sea is rough, with the wind against the tidal stream, or when the monsoon is strong, the limits of the reefs in the channels are hard to see, and if the leading marks are not very clear, the channels will be found very difficult to follow.

**Inner roadstead.—Islets and dangers.—Clearing marks.**

The inner roadstead lies between the coast and the chain of islands and reefs extending from Cap Voailava to Pointe Baron, and affords ample room for anchoring; the northern part of this roadstead is, however, not recommended, as the depths are irregular, the tidal streams at times very strong, and the sea rough during the south-east monsoon.

Nosy Mpay, together with the shoals in its vicinity, lying at the northern end of the roadstead, are described on pages 152-153; Récif Est, about 1½ miles westward of Nosy Mpay, and Récif de la Fosse, about one mile southward of Récif Est, are described on page 153; a shoal, with a least depth of 2½ fathoms (4<sup>m</sup>6) over it, lies about one mile south-westward of Récif de la Fosse.

Les Cristaux (*Lat. 12° 11' S., Long. 49° 08' E.*), lying about 2 miles east-south-eastward of Récif de la Fosse, is described on page 153; a reef, which dries 2 feet (0<sup>m</sup>6), lies about half a mile north-north-eastward of this islet, and is at the southern end of a shallow bank which extends about 1½ miles north-westward and half a mile eastward of the reef, with a depth of 2½ fathoms (4<sup>m</sup>6) at its north-western and 1½ fathoms (2<sup>m</sup>3) at its eastern end.

Banc de l'Entrée (Entrance shoal), with a least depth of 4 feet (1<sup>m</sup>2), coral, over it, lies about 2½ miles south-south-westward of Les Cristaux; shoals, with depths of 4½, 3½, 4½, 4½, and 4½ fathoms (7<sup>m</sup>8, 6<sup>m</sup>9, 8<sup>m</sup>7, 8<sup>m</sup>2, and 7<sup>m</sup>8), lie about 1½ miles west-north-westward, 1½ miles westward, three-quarters of a mile south-westward, three-quarters of a mile south-south-westward, and half a mile south-south-eastward, respectively, of this bank.

The southern extremity of Ilot du Courier, which is situated about 3½ miles south-south-eastward of Les Cristaux, in line with the north-western peak of Les Mamelles, two bare rounded summits, 808 feet (246<sup>m</sup>3) high, about three-quarters of a mile eastward of Ilot du Courier, bearing 098°, leads between Banc de l'Entrée and the shallow spit extending about one mile north-north-westward of Pointe Basse, the south-western entrance point of Baie du Courier.

Nosy Famaho, lying about 3½ miles south-south-westward of Récif de la Fosse, is a basaltic islet, 62 feet (18<sup>m</sup>9) high, covered with bushes, and is fringed by a coral reef which shows plainly; it lies at the south-

*Chart 1002.*

eastern edge of a shallow bank which connects Nosy Hara with the reef extending south-eastward of Nosy Hao.

Les Cristaux in line with Le Coq (page 146), bearing 045°, leads through the fairway between Banc de l'Entrée and Nosy Famaho. 5

Bancs de la Petite Passe (Little Pass banks), a group of shoals with a least depth of 1½ fathoms (2<sup>m</sup>7) over them, lie about three-quarters of a mile westward of Nosy Famaho.

Récifs de Nosy Hara, lying about 1½ miles south-eastward of Nosy Hara (*Lat. 12° 15' S., Long. 49° 01' E.*), consist of three detached reefs; 10 the northern reef dries 6 feet (1<sup>m</sup>8).

Nosy Foty seen over the sandy isthmus at the northern end of Nosy Hara, bearing 310°, leads between Bancs de la Petite Passe and Récifs de Nosy Hara, and the southern extremity of Nosy Hara in line with the southern extremity of Nosy Anjombavola, bearing about 250°, 15 also leads between the same dangers.

**Directions.**—The passes between Cap Voailava and Grand Récif giving access to the inner roadstead are described on pages 152-154.

A vessel approaching from southward, having rounded Cap St. Sébastien, should steer with Potopoto, a bare yellow hill, 194 feet 20 (59<sup>m</sup>1) high, situated on the coast about 2½ miles north-eastward of Pointe Baron in line with Ankitikona (page 151), bearing 084°, until Pointe Baron bears 165°; she should then alter course north-north-eastward and steer with Nosy Mely, bearing 027° and just open north-westward of the north-western extremity of Nosy Hara, which leads 25 between the dangers southward of Grand Récif and those northward of Pointe Baron. When Nosy Famaho is in line with Le Coq, bearing 048°, this transit should be held, passing close south-eastward of the rocky shoal, with a depth of 4½ fathoms (7<sup>m</sup>8) over it, lying about three-quarters of a mile south-south-eastward of Nosy Mely, until Pointe 30 Mangoaka, the eastern entrance point of Baie d'Ambararata, is in line with Les Mamelles, bearing 078°, which should be steered for until Les Cristaux is in line with Le Coq, bearing 045°, which leads into the inner roadstead.

**Baie Antsantsa.**—Baie Antsantsa, the first indentation on the 35 northern side of Baie Andramaimba, lies about 2 miles eastward of Cap Voailava; its shores are fringed by a reef, and numerous shoals lie in its approaches. This bay should only be used by small vessels with local knowledge.

**Baie Miroana.**—**Dangers.**—**Anchorage.**—Baie Miroana (*Lat. 40 12° 07' S., Long. 49° 10' E.*), close south-eastward of Baie Antsantsa, from which it is separated by the coastal bank, which here extends about 7 cables offshore with a depth of 2 fathoms (3<sup>m</sup>7) at its southern edge, has several shoals, with a least depth of 1½ fathoms (2<sup>m</sup>7), lying in its approach; the positions of these shoals can best be seen on the 45 chart.

The promontory, of which Ambatoarara (page 151) is the summit, forms the south-eastern side of this bay.

Landing may be effected on a sandy beach at the south-eastern side of the inner part of the bay. 50

Small vessels with local knowledge can obtain anchorage northward of Ambatoarara in depths of from 5 to 6 fathoms (9<sup>m</sup>1 to 11<sup>m</sup>0), good holding ground.

**Baie Amponkarana.**—**Dangers.**—Baie Amponkarana, lying on

*Chart 1002.*

the south-eastern side of Ambatoarara, has its shores bordered with mangroves ; the southern entrance point is a long point covered with trees, from which a sandspit extends under water for about  $3\frac{1}{4}$  cables  
 5 northward and which can be easily seen owing to the discoloration of the water. The shores of this bay are fringed by a coral reef, which dries in parts.

The northern side of the entrance is moderately bold round the foot of the promontory, but a rocky bank, with a least depth of  $1\frac{1}{2}$  fathoms  
 10 (2<sup>m</sup>7) over it, lying about  $2\frac{1}{4}$  cables south-westward of it, extends about  $1\frac{1}{4}$  miles south-westward.

Baie Amponkarana is divided into two parts by a detached coral reef, which dries in parts, lying near the centre of the bay and about  $2\frac{1}{4}$  cables offshore ; a detached rock, with a least depth of 4 feet  
 15 (1<sup>m</sup>2) over it, lies about one cable westward of this reef, and is steep-to.

Landing can be effected near a small village on the coast, on the eastern side of the bay, westward of a conspicuous bare hill, situated about  $1\frac{1}{2}$  miles north-north-eastward of the southern entrance point ; landing can also be effected on the coast about one mile south-south-  
 20 eastward of the landing place just described.

**Directions.—Anchorage.**—A vessel with local knowledge making Baie Amponkarana can, after passing northward or eastward of Récif de la Fosse, make use of the following leading marks : the north-western extremity of Ambatoarara in line with Le Coq (page 146),  
 25 bearing  $059^\circ$  ; Cap Voailava, astern, bearing  $320^\circ$ , just open south-westward of Nosy Pahanjy ; the above-water rock close off the south-western side of Nosy Vaha, astern, bearing  $278^\circ$ , open northward of the northern extremity of Nosy Mavony ; Les Cristaux in line with Ambohposa, the rounded summit of Presqu'île d'Orontany, astern,  
 30 bearing  $229^\circ$ . Cap Voailava, astern, bearing  $297^\circ$ , a little open south-westward of the south-western extremity of the promontory on the northern side of the entrance to Baie Amponkarana, leads to the anchorage.

A vessel of light draught with local knowledge coming from west-  
 35 ward or southward can find a more direct route by means of the chart than the ones indicated by the leading marks given above.

The best anchorage is on the southern side of the bay in depths of  $5\frac{1}{2}$  fathoms (10<sup>m</sup>1), mud, with Cap Voailava (*Lat.*  $12^\circ 06' S.$ , *Long.*  $49^\circ 06' E.$ ), bearing  $297^\circ$ , a little open of the south-western extremity  
 40 of the promontory on the northern side of the entrance to the bay, and Les Cristaux, bearing  $240^\circ$ , just open south-westward of the southern entrance point. There is a heavy swell in this bay during the south-east monsoon.

**Baie Lomotro.**—Baie Lomotro, the northern entrance point of  
 45 which is situated about  $1\frac{1}{4}$  miles south-south-westward of the southern entrance point of Baie Amponkarana, is a small bay, at the head of which stands the village of Lomotro ; the southern entrance point of the bay, about three-quarters of a mile south-south-westward of the northern entrance point, is a conspicuous rounded bluff, 210 feet  
 50 (64<sup>m</sup>0) high, covered with casuarina and baobab trees.

A spit, which dries 2 feet (0<sup>m</sup>6), extends about  $6\frac{1}{4}$  cables west-north-westward of the northern entrance point of Baie Lomotro ; the reef lying about  $3\frac{1}{4}$  cables further west-north-westward, and Les Cristaux, half a mile south-south-westward of it, are described on pages 154

*Chart 1002.*

and 153, respectively. A spit, with a depth of 3 fathoms (5<sup>m</sup>5) at its north-western edge, extends about 7 cables west-north-westward of the southern entrance point.

**Baie du Courier.**—Baie du Courier, which is entered between 5  
Pointe Basse and a point about 3 miles north-eastward, is the principal anchorage in the inner roadstead and affords good shelter as it is only open north-westward, from which direction it is sheltered by the outer line of reefs; it is connected by a pass through the hills, called Col du Courier, with Baie de Diégo-Suarez, on the eastern side of 10  
Madagascar, about 7½ miles east-south-eastward.

**Aspect.**—The north-eastern side of this bay is overlooked by Andramaimbo (page 145); about 1½ miles southward of this mountain are Les Mamelles (page 154). From the latter a range of hills, which is 15  
thickly wooded and interspersed by a number of streams, trends southward; the highest and most conspicuous peak of this range is Sommet Nu, 1,152 feet (351<sup>m</sup>1) high, situated about 1½ miles southward of Les Mamelles; at the southern end of this range, about 2 miles south-westward of Sommet Nu, stands La Selle, 489 feet (149<sup>m</sup>0) high, near the head of the bay. 20

The shores of the bay are bordered by mangroves; at the north-eastern corner, where the road runs to Baie de Diégo-Suarez, is the village of Andramaimbo, where there is a military station and a flagstaff.

**Islet and dangers.**—Shoals, with depths of 2½ and 3 fathoms 25  
(5<sup>m</sup>0 and 5<sup>m</sup>5) over them, lie about 7 cables and one mile, respectively, west-south-westward of the northern entrance point of Baie du Courier.

Banc de l'Entrée and the shoals in its vicinity are described on page 154. 30

A rocky shoal, on which lies a patch, which dries 3 feet (0<sup>m</sup>9), extends about one mile north-north-westward of Pointe Basse.

Ilot du Courier (*Lat. 12° 14' S., Long. 49° 09' E.*), about 7 cables offshore, lies at the southern end of a bank, with a least depth of one fathom (1<sup>m</sup>8) over it, which extends about 1½ miles westward from the 35  
eastern side of the bay; Ilot du Courier is 26 feet (7<sup>m</sup>9) high; a detached rock, 17 feet (5<sup>m</sup>2) high, lies close westward of the south-western end of this islet.

**Directions.—Anchorages.**—A vessel coming from northward and bound for an anchorage in Baie du Courier should steer with the 17-foot 40  
(5<sup>m</sup>2) high rock, mentioned above, in line with Sommet Nu, bearing 136°, until Andramaimbo bears 070°, when it should be steered for on that bearing, anchoring when Les Mamelles bear 125° and are a little open south-westward of the military station at the north-eastern corner of the bay. 45

If coming from southward a vessel should steer into the bay with the southern extremity of Ilot du Courier in line with the north-western peak of Les Mamelles, bearing 098°, which leads through the fairway, passing southward of Banc de l'Entrée. When Andramaimbo 50  
bears 070° a vessel should proceed as previously directed.

Anchorage can be obtained in depths of from 5 to 7½ fathoms (9<sup>m</sup>1 to 13<sup>m</sup>7), but care must be taken to anchor where there is good holding ground of mud or of sand and mud.

During the south-east monsoon there are sometimes heavy off-shore

*Chart 1002.*

squalls, rendering it necessary to anchor close off the south-eastern shore of the bay, but this is only possible for light draught vessels.

The most sheltered anchorage is northward of Ilot du Courier in 5 depths of from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  fathoms ( $6^m9$  to  $7^m8$ ), mud, with the eastern extremity of that islet bearing  $199^\circ$  and Les Mamelles bearing  $125^\circ$  and a little open south-westward of the military station at the north-eastern corner of the bay; this latter mark is not easily seen.

Landing can be effected on a sandy beach in the neighbourhood of 10 the village of Andramaimbo, but owing to some rocks, which dry, lying in this vicinity, it should not be attempted before half-tide.

Landing can also be effected at the village of Bobatolana, about 15  $1\frac{1}{2}$  miles southward of Ilot du Courier, also on the eastern side of Pointe Basse, in the vicinity of the huts; this latter landing place cannot be used during the south-east monsoon.

**Baie d'Ambararata.**—Pointe Mangoaka, the eastern entrance point of Baie d'Ambararata, situated about  $1\frac{1}{2}$  miles west-south-westward of Pointe Basse, is the extremity of a wooded hillock, 331 feet ( $100^m9$ ) high, and is fringed by a reef; a detached coral shoal, with 20 a least depth of  $2\frac{3}{4}$  fathoms ( $5^m0$ ) over it, lies about  $8\frac{1}{2}$  cables, and a spit, with a least depth of  $4\frac{1}{2}$  fathoms ( $7^m8$ ) over it, extends about  $1\frac{1}{2}$  miles north-westward of this point.

The western entrance point, about  $2\frac{1}{2}$  miles south-westward of Pointe Mangoaka, is fringed by a reef which dries, and which extends 25 about 6 cables east-north-eastward and thence  $4\frac{1}{2}$  cables west-north-westward; several rocks lie on this reef, of which the northernmost is 12 feet ( $3^m7$ ) high, and the highest, about 2 cables east-north-eastward of the point, 42 feet ( $12^m8$ ) high.

The head of the bay is bordered by mangroves, among which numerous 30 streams discharge a quantity of alluvial deposit which has formed a shallow flat extending as much as  $7\frac{1}{2}$  cables offshore.

Ambararata (*Lat.  $12^\circ 20'$  S., Long.  $49^\circ 06'$  E.*), a large village with a flagstaff, is situated on the eastern side of the bay, about 3 miles southward of Pointe Mangoaka. A little southward of this village 35 a river of the same name flows into the bay, between steep banks of red clay; a bar at the entrance of the river prevents boats entering except at high water, but within the bar there are depths of from 10 to 13 feet ( $3^m0$  to  $4^m0$ ).

Ankitikona (page 151) is situated about three-quarters of a mile 40 inland from the head of the bay and about one mile south-south-eastward of Le Chien, a point 82 feet ( $25^m0$ ) high.

**Anchorage.**—Vessels drawing not more than 19 feet ( $5^m8$ ) can anchor in the south-western part of the bay, with the centre of the reef east-north-eastward of the western entrance point in line with the 45 large rock at the north-eastern extremity of Nosy Hara (page 152), bearing  $325^\circ$ , and Les Cristaux (page 153), bearing  $028^\circ$ , and just open north-westward of Pointe Mangoaka. The bottom everywhere in the bay is mud, with good holding ground. The offshore squalls are sometimes very strong.

50 **Coast.—Dangers.**—From the western entrance point of Baie d'Ambararata the coast trends about 8 miles south-westward to Pointe Baron, and is indented by two small bays, Baie de Manankarana and Baie d'Ampasimena.

The former, which is filled with the coastal reef, can only be visited

*Chart 1002.*

at high water ; a large stream, which boats can ascend for about 2 miles, discharges into its head.

The latter, which is shallow, offers useful shelter to small vessels with local knowledge, especially from north-easterly squalls at the changes of the seasons ; both shores are fringed by reefs, which reduce the navigable channel to about a quarter of a mile in width. Landing can be effected close to Djimanguira (Jiamangiara), a village on the eastern side of this bay.

A reef, which dries, extends about 9 cables north-westward from the peninsula separating Baie de Manankarana and Baie d'Ampasimena ; a rock, one foot (0<sup>m</sup>3) high, stands at the north-western extremity of this reef.

The coast between the south-western entrance point of Baie d'Ampasimena and Pointe Baron is fringed by a reef which extends as much as 7 cables offshore ; a detached reef, which dries 4 feet (1<sup>m</sup>2), lies about 8 cables west-north-westward of the south-western entrance point of Baie d'Ampasimena and the same distance offshore. A small detached reef, about three-quarters of a mile northward of Pointe Baron and half a mile offshore, dries.

Potopoto (page 155) may be considered as the point of separation of the coast into two very distinct zones. Northward a vessel is sheltered from the ocean swell by islands and banks, but there is very little shelter from the south-east monsoon, except close under the land. Southward, on the contrary, in Baie de Befotaka, and round Pointe Mandoavoa (*Lat.* 12° 27' S., *Long.* 48° 44' E.), the south-westerly swell is strongly felt, especially during the months of January, February, and March ; landing is difficult, but a vessel is sheltered from the south-east monsoon by Montagne d'Ambre and its numerous spurs.

Pointe Baron is a wooded bluff, 228 feet (69<sup>m</sup>3) high, fringed with mangroves ; its western side is steep.

**Anchorage.**—Small vessels with local knowledge can obtain anchorage off the mouth of Rivière Mahamindro, which flows into the sea southward of Potopoto ; the bottom is sand and mud, and it is well sheltered from south-easterly winds.

Rivière Mahamindro is very full during the rainy season, but almost dries at other times.

**Baie de Befotaka.—Aspect.**—Baie de Befotaka (page 149) extends southward for about 6 miles ; it may be identified by the native huts scattered along its shores and by the summits of Presqu'île d'Orontany, which are dominated by Ambohiposa (page 156), and are good landmarks.

Mont Pelé, a conspicuous bare flat hill, 992 feet (302<sup>m</sup>8) high, is situated about one mile southward of the head of the bay ; a range of somewhat lower hills, with conical wooded summits, extends north-eastward of it to the coast.

*Charts 1002, 758.*

About 1½ miles southward of Mont Pelé is a conspicuous flat-topped summit, 1,080 feet (329<sup>m</sup>2) high ; Coin, a conspicuous summit, 1,072 feet (326<sup>m</sup>7) high, is situated about three-quarters of a mile eastward of the flat-topped summit, and Le Diable, another conspicuous summit, 1,316 feet (401<sup>m</sup>1) high, three-quarters of a mile south-south-eastward of Coin.

*Chart 1002.*

Sommet Dépouillé (Mount Ironono), a bare summit, 451 feet (137<sup>m</sup>5)

*Charts 758, 2762, 597, 748a, 748b.*



*Chart 1002.*

high, is situated about  $2\frac{1}{2}$  miles south-eastward of Pointe Baron, and Sommet Rôti, 923 feet (181<sup>m</sup>3) high, about 5 miles eastward of Sommet Dépouillé.

- 5 About  $4\frac{1}{2}$  miles north-westward of Mont Pelé and  $1\frac{1}{2}$  miles from the western shore of the bay, Ambatobé, a peak conspicuous for its dark colour and steep sides, rises to an elevation of 848 feet (258<sup>m</sup>5) amongst the bare yellow hills which border the coast.

Southward of Ironono, a village on the coast about  $1\frac{1}{2}$  miles south-  
10 south-eastward of Pointe Baron, are some conspicuous white cliffs which stand out clearly against the reddish soil in the vicinity.

The large village of Befotaka is situated on the coast about  $5\frac{1}{2}$  miles south-south-westward of Ironono; a conspicuous waterfall lies from 2 to 3 miles south-eastward of this village.

- 15 The villages of Fararano, Antamanaka, and Rangotso are situated on the western side of the bay, the former about half a mile southward of the western entrance point, and the other two near the middle of the western shore.

**Islets and dangers.**—The shores of Baie de Befotaka are fringed by  
20 coral reefs, in places, extending only a short distance offshore.

Fronting the entrance to Baie de Befotaka (*Lat. 12° 24' S., Long. 48° 55' E.*), about  $4\frac{1}{2}$  miles northward of the western entrance point, lies a bank which extends about  $1\frac{1}{2}$  miles northward and has a least depth of  $1\frac{1}{2}$  fathoms (2<sup>m</sup>7) over it; about a quarter of a mile westward  
25 of this bank is another bank, which extends about  $2\frac{1}{2}$  miles north-north-westward and south-south-eastward, with a least depth of 4 fathoms (7<sup>m</sup>3).

A reef, which dries one foot (0<sup>m</sup>3), and another, which dries 2 feet (0<sup>m</sup>6), lie about  $2\frac{1}{2}$  miles northward and 3 miles north-eastward, respectively,  
30 of the western entrance point.

A rock, with a depth of 4 feet (1<sup>m</sup>2) over it, lies near the centre of the bay, about 3 miles south-westward of Pointe Baron.

Nosy Misangy lies on the coastal reef about half a mile south-eastward of the western entrance point of the bay.

- 35 Andriva Rangotro, a detached reef, which dries 9 feet (2<sup>m</sup>7) at its eastern end, lies about 2 miles south-eastward of Nosy Misangy and one mile offshore.

Nosy Mahonotsa, 119 feet (36<sup>m</sup>3) high, lies on the coastal reef on the eastern side of the bay, about  $3\frac{1}{2}$  miles southward of Pointe Baron;  
40 a detached reef, awash, lies about half a mile north-westward of it.

A detached coral rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies about  $1\frac{1}{2}$  miles east-south-eastward of Andriva Rangotro, and about three-quarters of a mile eastward of this rock, within a short distance of the coastal reef, is a shoal, with a depth of 3 feet (0<sup>m</sup>9)  
45 over it.

A rock, 12 feet (3<sup>m</sup>7) high, stands at the head of the bay about three-quarters of a mile west-north-westward of the village of Befotaka.

**Directions.—Anchorages.**—A vessel approaching from westward should, after clearing the northern point of Presqu'île d'Orontany,  
50 bring Sommet Dépouillé in line with Sommet Rôti, bearing 092°, which leads about one mile southward of the two reefs, which dry, fronting the entrance to the bay, and about three-quarters of a mile northward of the rock with a depth of 4 feet (1<sup>m</sup>2) over it.

The bay is open to northerly winds, and a south-westerly swell is

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 1002.*

strongly felt, especially from January to March. It is well sheltered from the south-east monsoon, and during this season there is scarcely any wind felt in the bay. There is good holding ground of mud and sand. Landing is difficult.

Baie Ironono, close southward of Pointe Baron, is open to a swell from seaward, and is unsafe during strong westerly winds. Small craft can anchor in the southern part of the bay, opposite the cliffs, taking care to avoid the reefs around the shores of the bay, which are not visible at high water, but anchorage in this bay is not recommended.

Landing can be effected in Baie Ironono at the mouth of the stream southward of the village (*Lat. 12° 24' S., Long. 48° 59' E.*), but the coastal reef prevents boats approaching other parts of the sandy beach, which forms the shore of this bay, at low water.

**Caution.**—See page 163.

**Coast.**—**Islets and dangers.**—Presqu'île d'Orontany, the north-western end of which is called Cap St. Sébastien, has many pointed peaks; Ambohiposa, the highest of these, is mentioned on page 156; the bare steep sides of the upper part of this mountain join the gradual declivities which terminate at Pointe Maruteza, the northern extremity of the peninsula, and at Pointe Mandoava, its south-western extremity.

The northern and western sides of Presqu'île d'Orontany are fringed by a reef, which is steep-to, and which extends about 4 cables northward of Pointe Maruteza.

A bank, with a least depth of  $5\frac{1}{2}$  fathoms ( $9^m6$ ) over it, extends about  $2\frac{1}{2}$  miles north-north-westward from the coast between Pointe Maruteza and a point about  $1\frac{1}{4}$  miles west-south-westward; Rochers Ambasavaka, 27 feet ( $8^m2$ ) high, about 7 cables north-westward of Pointe Maruteza, are fringed by a reef, which is steep-to; Yang Tse, a rock with a depth of  $1\frac{1}{4}$  fathoms ( $2^m3$ ), coral, lies at the western edge of this bank, about  $1\frac{1}{2}$  miles westward of Rochers Ambasavaka.

Kaloinisampa, two rocks, above water, about 6 miles west-south-westward of Rochers Ambasavaka, in line with Nosy Mavony, a rock 133 feet ( $40^m5$ ) high, about  $1\frac{1}{4}$  miles further west-south-westward, bearing  $246^\circ$ , leads about a quarter of a mile south-eastward of Yang Tse.

Between the point  $1\frac{1}{4}$  miles west-south-westward of Pointe Maruteza and Pointe Mandoava, about  $2\frac{1}{4}$  miles south-south-westward, the coast recedes, forming Baie d'Andovo Honkou; a village of the same name is situated about  $1\frac{1}{2}$  miles north-eastward of Pointe Mandoava. A small stream flows into this bay through the mangroves; the tidal influence is felt in it for a cable or so from its mouth, above which are a few pools of muddy water. The surrounding country appears parched.

A bank, with a least depth of 7 fathoms ( $12^m8$ ) over it, fronting the entrance to Baie d'Andovo Honkou, lies about  $1\frac{1}{2}$  miles west-south-westward of the north-eastern entrance point of the bay and  $1\frac{1}{4}$  miles offshore.

Tsiankazo, an islet, 198 feet ( $60^m3$ ) high, lying with its northern extremity about 4 cables southward of Pointe Mandoava, is connected with this point by a reef, which dries; an above-water rock lies on this reef. This islet assists in identifying Pointe Mandoava.

**Off-lying islands and dangers.**—**Islands westward of Cap St. Sébastien.**—**Anchorage.**—A group of islands and islets lie within

*Chart 1002.*

about  $4\frac{1}{2}$  miles westward of Cap St. Sébastien ; channels, with moderate depths, separate these islands from the mainland and from each other.

- 5 Nosy Valiha (*Lat.*  $12^{\circ} 23' S.$ , *Long.*  $48^{\circ} 43' E.$ ), the northernmost island of this group, 471 feet ( $143^m6$ ) high, lying about 2 miles offshore, is fringed with a coral reef, except on its south-western side ; a bank, with a least depth of  $3\frac{1}{2}$  fathoms ( $6^m4$ ) over it, extends about 3 miles north-westward of this island.

- 10 There is anchorage in depths of 15 fathoms ( $27^m4$ ), sand and coral, with Nosy Mavony, bearing  $290^{\circ}$ , distant  $2\frac{1}{2}$  cables.

Nosy Fisaka, the westernmost islet of this group, lying about three-quarters of a mile west-south-westward of Kalomisampa, is covered with guano, and can easily be identified as Nosy Mavony lies about

- 15 2 cables south-westward of it.

Nosy Mananono, 661 feet ( $201^m5$ ) high, lying about  $1\frac{1}{2}$  miles south-eastward of Nosy Fisaka, is connected by a bank, having a least depth of  $6\frac{1}{2}$  fathoms ( $11^m9$ ) over it, with Nosy Fisaka and Kalomisampa ; a reef, which fringes its north-western side, extends about  $3\frac{1}{2}$  cables

- 20 north-westward of this island. A reef, above water, lies about one cable from the eastern side of Nosy Mananono, and a rock, above water, close westward of its southern end.

- Nosy Tanga, 257 feet ( $78^m3$ ) high, lying about 6 cables north-westward of Pointe Mandoava, has a chain of above-water rocks extending  
25 about 3 cables south-south-westward from its southern extremity, terminating in a rock, 215 feet ( $65^m6$ ) high ; other rocks border its coasts.

- Ambamonetsimany, about 4 cables south-westward of the 215-foot ( $65^m6$ ) high rock, is a rugged rock, 54 feet ( $16^m5$ ) high, resembling a  
30 haystack.

Mandazona is an islet, 392 feet ( $119^m3$ ) high, lying about one mile southward of Ambamonetsimany and three-quarters of a mile offshore.

**Anchorages.—Directions.**—There is perfectly sheltered anchorage during the south-east monsoon east-north-eastward of Pointe Maruteza.

- 35 Vessels waiting for daylight to enter Baie Andramaimba can find anchorage in Baie d'Andovo Honkou, off the village of that name ; the best anchorage is in the southern part of the bay where the coastal reef narrows considerably. There are moderate depths here within a short distance of the shore, and vessels should anchor as close inshore  
40 as possible ; the bottom is compact sand with good holding ground. This anchorage is only safe during the south-east monsoon ; it would be dangerous during the rainy season, on account of its proximity to the coastal reef.

- A vessel leaving Baie d'Andovo Honkou to enter Baie Andramaimba  
45 can avoid the coastal reef in the northern part of the former bay by keeping the south-eastern extremity of Mandazona, astern, bearing  $203^{\circ}$ , open north-westward of Pointe Mandoava.

*Chart 758.*

- Outlying banks.**—Leven bank, the northern extremity of which is  
50 situated about 43 miles west-north-westward of Cap St. Sébastien (*Lat.*  $12^{\circ} 25' S.$ , *Long.*  $48^{\circ} 46' E.$ ), extends about 30 miles south-south-westward, and has a least depth of 10 fathoms ( $18^m3$ ) near its south-western end ; Castor bank, about 18 miles in extent, with a least depth of 7 fathoms ( $12^m8$ ), lies close south-westward of Leven bank. From

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 758.*

soundings taken, in 1933, by the *Bougainville*, it would seem that these two banks are really one bank.

Banc de la Cordelière, on which, in 1860, a vessel of that name obtained depths of from 32 to 36 fathoms (58<sup>m</sup>5 to 65<sup>m</sup>8), coral and broken shells, lies about 16 miles north-westward of Leven bank. In 1945, H.M.S. *Burnet* obtained by sounding, a least depth of 22 fathoms (40<sup>m</sup>2) on this bank; there may, however, be lesser depths here.

The s.s. *Baron Cawdor* reported, in 1911, striking a shoal in lat. 12° 23' S., long. 47° 39½' E., about 2½ miles from the north-western side of 10 Leven bank; the vessel's way was not stopped and no sign of shoal water was observed, but a depth of 28 fathoms (51<sup>m</sup>2), sand, was obtained shortly after striking.

*Charts 1002, 758.*

**Coast.—General remarks.**—Between Presqu'île d'Orontany and 15 Presqu'île d'Ambato, about 57 miles south-south-westward, the coast, which is fringed by a coral reef, recedes, forming a bay.

The depths off the coast southward of Pointe Andiako, about 22 miles south-south-eastward of Cap St. Sébastien, are less than those farther northward, and decrease gradually towards the coast. The 20 coast southward of Pointe Andiako has a sandy beach, is low and of a darkish colour, and does not show up against the mountains in the background; these mountains are often obscured by fog. A vessel close inshore can often see nothing except an occasional bush fire or the light of a village. 25

The land within the coast is little wooded, except in the valleys and on the sides of Montagne d'Ambre (page 145); it is covered with grass and is but little cultivated.

The inhabitants on this part of the coast are engaged in fishing, and native boats may sometimes be met with a long way offshore. 30

Anchorage may be obtained during the day in every part of this bay, the depths being moderate, the bottom sand, sandy mud, or mud; the sea breeze is usually moderate and the water smooth, especially towards Baie d'Ambaro, on the north-eastern side of Presqu'île d'Ambato, where the strong land breeze from east-south-eastward is 35 less felt.

Vessels should not close the coast between Cap St. Sébastien and Pointe Andiako at night. The coastal reef hereabouts is difficult to see, and being steep-to, its proximity is not indicated by soundings. Southward of Pointe Andiako the bottom is more shelving, and sound- 40 ing gives warning of the approach to the coast.

*Chart 758.*

**Caution.**—Between Cap St. Sébastien (Lat. 12° 25' S., Long. 48° 46' E.) and Pointe Andiako and towards Nosy Lava, about 17 miles southward of the western extremity of Cap St. Sébastien, the water 45 being turbid, the coral reefs can only be seen from a short distance. Patches of spawn occasionally have the appearance of coral reefs, and the water sometimes appears yellow over a depth of 4 fathoms (7<sup>m</sup>3); this yellow discoloration sometimes appears in large patches giving every appearance of dangerous shoals, without sounding showing any 50 change of depth; it may be due either to spawn or to the mud stirred up from the bottom by tidal or other influences.

*Chart 1002.*

**Tidal streams.**—The tidal streams off Cap St. Sébastien are

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 1002.*

irregular. The flood stream usually sets south-westward and the ebb stream north-eastward, as in Baie Andramaimba; both streams are strong. With a fresh breeze off the cape the sea becomes covered with foam and has the appearance of breakers.

**Coast.**—The south-western coast of Presqu'île d'Orontany is exposed to south-easterly winds and sea which strike it obliquely, but there are protected anchorages in case of need. The coast is free from dangers except for a reef which fringes it and may be coasted along at a distance of a mile offshore.

A number of small villages lie along this coast and at the inner part of the bays.

Baie Rantabé, on the southern side of Cap St. Sébastien, is open southward, and its shores are fringed by a reef; it is only used by native boats.

*Chart 317, plan of Andranoamby bay.*

Baie Andranoamby, on the eastern side of Cap St. Sébastien, extends for about 2 miles northward; it affords shelter from all winds except those from between south and west, which rarely blow with any force except during the rainy season. In the dry season the strong south-easterly breeze raises a heavy swell which runs round the entrance point and enters the bay, but apart from this inconvenience it is safe. Several small villages lie along the eastern side of the bay.

The head of Baie Andranoamby dries out to a distance of about 3 cables. The western side of this bay is fringed in places by a reef, and a detached reef, which dries, lies about  $5\frac{1}{2}$  cables from the head of the bay and  $1\frac{1}{2}$  cables from the western shore; the eastern side of the bay is fringed by a reef which extends as far as 2 cables offshore.

Nosy Antolo, fronting the entrance to Baie Andranoamby, about  $1\frac{1}{2}$  miles south-south-westward of the western entrance point, is steep-to except on its eastern side, where a reef, which dries, extends about one cable east-north-eastward; a bank, with depths of less than 5 fathoms ( $9^m1$ ) over it, extends about 2 cables south-eastward of the islet. The coasts of this islet are mostly cliffy.

Baie Antsimaloto lies between the eastern entrance point of Baie Andranoamby (*Lat.*  $12^\circ 29' S.$ , *Long.*  $48^\circ 47' E.$ ) and a point about one mile south-eastward, but it is not recommended as an anchorage.

Faninana, an islet, 179 feet ( $54^m6$ ) high, about 7 cables south-westward of the south-eastern entrance point of Baie Antsimaloto, is connected with Antolohizana, an islet about  $2\frac{1}{2}$  cables east-north-eastward, by a shoal coral bank, the passage between them being impracticable; Antolohizana is connected to the coast by a natural bank of black basaltic shingle, which dries, but over which a boat may pass at high water. The space between Antolohizana and the coast, northward of the basaltic bank, is strewn with rocks and reefs of considerable extent. An islet lies about  $5\frac{1}{2}$  cables north-north-eastward of the northern extremity of Antolohizana. These islets are remarkable for their perpendicular basaltic cliffs on the seaward side, by which the entrance to this bay may be identified.

*Charts 317, plan of Ampamonti and Ampasindava bays; 1002.*

From the south-eastern entrance point of Baie Antsimaloto the coast trends about  $5\frac{1}{2}$  miles south-south-eastward to Pointe Oravaka, the north-western entrance point of Baie Ampamonty; about  $1\frac{1}{2}$  miles

*Charts 317, plan of Ampamonti and Ampasindava bays; 1002.*  
northward of that point, situated on the coast, is the village of Antsahabé.

*Chart 317, plan of Ampamonti and Ampasindava bays.*

**Baie Ampamonty.**—Baie Ampamonty affords good shelter to 5  
vessels of light draught, being only open south-westward and even  
from that direction being partly sheltered by islets and reefs.

The coastal reef fringes Pointe Oravaka and the north-western side  
of the entrance, also the south-eastern shore and part of the head of  
the bay. 10

About one mile northward of the head of the bay stands a conical  
hill, 717 feet (218<sup>m</sup>5) high, with trees on its summit.

There are several small villages on the shores of this bay.

**Islets and dangers.**—**Clearing marks.**—Oravaka is an islet,  
44 feet (13<sup>m</sup>4) high, lying about 5½ cables south-westward of Pointe 15  
Oravaka.

Banc Ampamonty, lying about 3½ miles southward of Oravaka and  
1½ miles offshore, dries, but in calm weather, when covered by a depth  
of a few feet, there is no appearance or warning of danger, even from 20  
a short distance.

The conical wooded hill, at the head of the bay, bearing about 030°,  
open north-westward of Nosy Vory, an islet, 228 feet (69<sup>m</sup>5) high,  
lying on the south-eastern side of the entrance to the bay, leads about  
3½ cables north-westward of Banc Ampamonty; if the conical wooded  
hill cannot be seen a vessel should not bring the summit of Nosy Vory 25  
to bear less than 040°.

The same conical hill in line with a conical 164-foot (50<sup>m</sup>0) hill,  
about 1½ miles south-south-westward, bearing 021°, leads through the  
fairway between the coast and Banc Ampamonty.

Nosy Vory, with some huts on its eastern side, lies about 7 cables 30  
offshore and westward of the village of Ampasimanahy; it is connected  
with the coast by a bank with a least depth of 3 fathoms (5<sup>m</sup>5) over it.

Jio Jio (*Lat. 12° 36' S., Long. 48° 51' E.*), two rocks, about 24 feet  
(7<sup>m</sup>3) high, lying in mid-channel, about one mile northward of Nosy  
Vory, stand on the north-western edge of a reef, which dries, and 35  
extends about 5 cables eastward of the western rock; this reef is  
situated near the centre of a bank, with depths of less than 3 fathoms  
(5<sup>m</sup>5) over it, and which extends about 9 cables east-north-eastward and  
west-south-westward.

Nosy Antaly, 474 feet (144<sup>m</sup>3) high, lying about 1½ miles north- 40  
north-eastward of Jio Jio, is conical, and covered with trees; it is  
fringed by a reef and a shallow bank. A detached shoal, with a least  
depth of 2 fathoms (3<sup>m</sup>7) over it, lies about 4½ cables south-south-east-  
ward of the south-eastern end of Nosy Antaly.

**Directions.**—**Anchorage.**—A vessel drawing more than 16 feet 45  
(4<sup>m</sup>9) can anchor at the entrance to the bay where it will be sheltered  
from south-easterly winds by Nosy Vory and the coast southward of  
that islet. This anchorage is exposed to westerly squalls.

A vessel bound for this anchorage from northward should pass west-  
ward of Oravaka, and thence between Jio Jio and Nosy Vory, whence 50  
the point about 1½ cables northward of the village of Ampasimanahy  
should be steered for, anchoring in depths of from 5 to 6½ fathoms  
(9<sup>m</sup>1 to 11<sup>m</sup>9).

A vessel proceeding to the head of the bay can pass between Jio

*Chart 317, plan of Ampamonti and Ampasindava bays.*

Jio and Nosy Antaly, but care must be taken not to pass more than 2½ cables from the south-eastern side of Nosy Antaly in order to avoid the detached shoal, with a least depth of 2 fathoms (3<sup>m</sup>7), 4½ cables south-south-eastward of this islet.

Alternatively a vessel can pass between Jio Jio and Nosy Vory, and then bring the 164-foot (50<sup>m</sup>0) hill, at the head of the bay, in line with the conical wooded hill, 1½ miles north-north-eastward, bearing 021°, which leads eastward of the 2-fathom (3<sup>m</sup>7) detached shoal, 10 mentioned above.

Small vessels can obtain good anchorage off Antafiabé, a village on the coast northward of Nosy Antaly, in depths of from 2½ to 3 fathoms (4<sup>m</sup>6 to 5<sup>m</sup>5). This anchorage is reached by passing eastward of Nosy Antaly, but care must be taken to avoid some projecting 15 sandspits. Vessels with local knowledge can leave this anchorage by passing between Nosy Antaly and the mainland north-westward.

**Baie Ampasindava.**—Baie Ampasindava, which is entered between Pointe Bekotoko, the south-eastern entrance point of Baie Ampamonty, and Nosy Tsiringidringitra, about one mile south-south-westward, 20 extends about 9 cables eastward; at the head of this bay is a sandy beach, behind which stands the village of Ampasindava.

From the south-eastern shore of the bay a coral reef, which dries, extends as much as 6½ cables offshore; Nosy Tsiringidringitra lies at its north-western edge, about 4½ cables north-westward of Pointe 25 Bemoka, with which it is joined by a ridge of stones.

Between Pointe Bekotoko (*Lat. 12° 38' S., Long. 48° 52' E.*) and the point 3 cables northward of Ampasindava is the entrance to a creek, which is bordered by mangroves; this creek dries out as far as its entrance. The village of Bekotoko stands on the north-western shore 30 of the creek, about 6 cables north-eastward of Pointe Bekotoko.

**Anchorage.**—This bay affords good temporary anchorage in depths of from 3½ to 6½ fathoms (6<sup>m</sup>4 to 11<sup>m</sup>9), sufficiently sheltered from south-easterly winds by Nosy Tsiringidringitra, Pointe Bemoka, and the reefs connecting them.

35 *Chart 758.*

**Coast.—Islets and dangers.**—From Pointe Bemoka the coast, which is fringed by a reef, trends about 1½ miles southward, where it recedes forming a small bay, Baie Ankazomalemy.

Baie Ankazomalemy, the shores of which are bordered with man- 40 groves, and behind which are several villages, is entered between Nosy Satza, an islet lying on the coastal reef about 2 cables southward of the northern entrance point, and Pointe Andamoty, about 2½ miles south-eastward of Nosy Satza; the coastal reef extends about 1½ cables southward of Nosy Satza. The head of the bay dries out to a distance 45 of about half a mile, and the bay within its entrance points is shallow.

*Chart 708, plan of Nosi Mitsio.*

From Pointe Andamoty the coast trends about 4 miles southward to Pointe Andiaiko and is fringed by a reef, which dries, and extends as much as 5 cables offshore; Nosy ny Andriana, lying at the edge of the 50 coastal reef, about 1½ miles southward of Pointe Andamoty, is connected with the coast by the coastal reef and a sandy isthmus which dries.

Nosy Mangiho, lying about midway between the coast and Iles Mitsio, is described on page 171.

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 708, plan of Nosi Mitsio.*

A 3-fathom (5<sup>m</sup>5) patch and a 2½-fathom (4<sup>m</sup>1) patch lie about 2½ and 1½ miles offshore, respectively, 17 and 20 miles south-south-westward of Pointe Andiako.

*Charts 708, plan of Nosi Mitsio; 758.*

Pointe Andiako approximately marks the southern termination of the rocks and reefs which fringe the coast from Cap St. Sébastien. Southward of this point the mountains recede, leaving low plains covered with vegetation between them and the coast. The coast is bordered with mangroves through which numerous rivers flow into the 10 sea; these rivers are mostly barred by alluvial mud.

The principal rivers on this stretch of the coast are the Sahinana, Mahebo, and Antoha. The Sahinana, which flows into the sea about 7 miles south-south-eastward of Pointe Andiako, cannot be entered on account of sandbanks; Rivières Mahebo and Antoha, which are 15 the only ones used by boats, flow into the sea about 14 and 25 miles, respectively, south-south-westward of Rivière Sahinana.

*Chart 758.*

**Anchorage.—Directions.**—Anchorage can be obtained in the entrance to Baie Ankazomalemy, about midway between Nosy Satza 20 and Pointe Andamoty (*Lat. 12° 42' S., Long. 48° 54' E.*).

*Chart 708, plan of Nosi Mitsio.*

Small vessels with local knowledge can obtain anchorage close inshore, off Pointe Andiako, in depths of 2½ fathoms (5<sup>m</sup>0); this anchorage is sheltered from the south-east monsoon which, in this 25 vicinity, usually dies down at sunset.

A vessel approaching the anchorage off Pointe Andiako should steer with the summit of Ankarea, described on page 168, astern, bearing 265°, well open southward of Mont Ankarana (page 168); these two conspicuous bluff hills show up well against the horizon, which is 30 ordinarily clear westward after sunset, and remain visible long after the other land has disappeared from view. In case of thick weather coming on before reaching the anchorage, a vessel should not approach within depths of 6 or 7 fathoms (11<sup>m</sup>0 or 12<sup>m</sup>8).

*Charts 708, plan of Nosi Mitsio; 758.*

**Off-lying islands and dangers.—Iles Mitsio.**—Iles Mitsio, a group of islands, islets, and rocks, lying about midway between Cap St. Sébastien and Presqu'île d'Ambato, are mostly of volcanic origin, with high basaltic columns, especially in the northern part of Nosy Mitsio, the largest island of the group, where they are particularly 40 striking.

*Chart 708, plan of Nosi Mitsio.*

**Tidal streams.—Current.**—Observations of the tidal streams off the eastern coast of Nosy Mitsio, were made in January and February, during the north-west monsoon. It was found that the flood stream 45 generally set between south-west and south-east, altering anti-clockwise; it attained its maximum rate about 3 hours before high water, and at high water set eastward and was very weak. The ebb stream set between north-east and west, altering anti-clockwise, and attained its maximum rate about 3 hours after high water. The maximum rate 50 observed was 1½ knots.

The current in the neighbourhood of this group usually sets westward; at a rate of from one to 2 knots.

**Outlying banks.**—Dives bank, about 8½ miles north-westward of

*Charts 758, 2762, 597, 748a, 748b.*



*Chart 708, plan of Nosi Mitsio.*

the northern extremity of Nosi Mitsio, has a least depth of 7 fathoms (12<sup>m</sup>8), coral, over it.

Ankarea bank, about 4½ miles west-north-westward of the same point, has a least depth of 6½ fathoms (11<sup>m</sup>9), coral, over it.

Castor shoal, about 11½ miles westward of the same point, has a least depth of 5½ fathoms (10<sup>m</sup>1), rock, over it.

Dives and Ankarea banks have not been carefully examined, and there may be lesser depths over them than are shown on the plan.

10 *Charts 708, plan of Nosi Mitsio; 758.*

There are depths of more than 30 fathoms (54<sup>m</sup>9) westward of these shoals, but the large area between them and Castor and Leven banks has been very partially examined, so caution is necessary when in this neighbourhood.

15 *Chart 708, plan of Nosi Mitsio.*

**Nosy Lava.**—Nosy Lava (Lat. 14° 32' S., Long. 47° 37' E.), the northernmost of the group, is 520 feet (158<sup>m</sup>8) high, barren, and bordered by perpendicular cliffs; a rock, which dries one foot (0<sup>m</sup>3), lies about 1½ cables westward of its northern extremity, and an islet, 20 which is connected by a rocky bank with its south-western side, lies about 1½ cables offshore.

The turbid water in this vicinity is described on page 163.

**Nosy Mitsio.**—**Aspect.**—Nosy Mitsio, lying about 5 miles south-westward of Nosy Lava, appears from a distance to consist of two islands, as the northern part is connected with the remainder of the island by a low narrow isthmus; Mont Ankarana, the highest part of Nosy Mitsio, rises near its northern extremity to a sugarloaf hill, 713 feet (217<sup>m</sup>2) high; Mont Leja, 448 feet (136<sup>m</sup>5) high, about 4½ miles south-south-westward of Mont Ankarana, lies at the centre 30 of the island.

From the southern part of Nosy Mitsio a hilly promontory extends about 3 miles north-westward, terminating in Pointe Mitaraka, 315 feet (96<sup>m</sup>0) high; Mont Mitsio, 513 feet (156<sup>m</sup>4) high, stands at its northern extremity.

35 The southern part of this island is well cultivated. Fruit, meat, and fowls are obtainable.

The coasts of Nosy Mitsio are almost everywhere fringed by coral reefs, and there are many detached rocks lying close offshore.

**Western side.**—**Islets and dangers.**—**Directions.**—**Anchor-**  
40 **ages.**—Nosy Fisaka, 106 feet (32<sup>m</sup>3) high, about one mile westward of the northern end of Nosy Mitsio, lies on a reef, which terminates westward in some black rocks and south-eastward in a ridge of shingle; between this ridge and the main island is a channel about 3 cables wide, in the centre of which lies a rock, with a depth of 2½ fathoms 45 (4<sup>m</sup>6) over it.

Ankarea, 775 feet (236<sup>m</sup>2) high, the highest islet of the Iles Mitsio group, with a broad summit, lies about one mile south-westward of Nosy Fisaka; it is free from dangers on its northern and western sides, but its southern side is fringed by a reef which extends about 2 cables 50 offshore, and a spit, which extends about 6 cables eastward from its eastern side, has a depth of 4½ fathoms (7<sup>m</sup>8) at its eastern edge.

Baie Maribé, on the north-eastern side of the promontory extending north-westward from the southern part of Nosy Mitsio, is entered between Pointe Ampanomilay, the north-eastern point of this prom-

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 708, plan of Nosi Mitsio.*

ontory, and Pointe Alankirimy, about 2 miles eastward; it is open to winds from north-east, through north, to north-west. A coral reef fringes the shores of this bay.

Roche Prévoyant, with a depth of less than one foot (0<sup>m</sup>3) over it, lies about 3½ cables north-westward of Pointe Alankirimy; south-eastward of Pointe Ampanomilay a spit, with a depth of 4½ fathoms (7<sup>m</sup>8), extending about 8 cables north-north-eastward from the shore, reduces the width of the entrance channel to about 8 cables.

A vessel bound for Baie Maribé can pass through the channel eastward of Nosy Fisaka, or through Passe du Nord, between Nosy Fisaka and Ankarea, or through Grande Passe, between Ankarea and Pointe Ampanomilay; the latter pass has moderate depths and is free from dangers. The other two channels should only be used by small vessels with local knowledge.

Good anchorage was obtained, in 1944, by the *Bougainville*, in depths of 11 fathoms (20<sup>m</sup>1), mud, about one mile south-westward of Pointe Alankirimy (Lat. 12° 53' S., Long. 48° 36' E.).

In 1921, the *Bellatrix* obtained good anchorage in depths of 9 fathoms (16<sup>m</sup>5), mud, about 1½ miles south-westward of the same point.

Small vessels with local knowledge can anchor off the head of the bay, in depths of from 3¼ to 3½ fathoms (5<sup>m</sup>9 to 6<sup>m</sup>9).

**South-western side.—Dangers.**—Between Pointe Mitaraka and Pointe Sud (South point), the southern extremity of Nosy Mitsio, about 4½ miles south-eastward, the coast forms a series of small bays, mostly filled with the coastal reef; a 7½-fathom (13<sup>m</sup>7) patch lies about 3 cables westward of Pointe Mitaraka.

Récif d'Ampanytsoha, which dries 6 feet (1<sup>m</sup>8), lies about 3½ cables offshore 1½ miles south-eastward of Pointe Mitaraka.

Récif de Marie, which dries 4 feet (1<sup>m</sup>2), lies about 1½ miles south-south-westward of Récif d'Ampanytsoha.

A shoal, with a depth of 4½ fathoms (7<sup>m</sup>8), coral, over it, lies about 6 cables west-south-westward of Pointe Sud.

**Eastern side.—Islet and dangers.**—A shoal, with a depth of 4 fathoms (7<sup>m</sup>3), coral, over it, lies about 1½ miles eastward of the northern extremity of Nosy Mitsio.

Rocher Rateau (Bateau rock), lying at the edge of the coastal reef, about 1½ miles south-eastward of the northern extremity of Nosy Mitsio and 3 cables eastward of Pointe Ambohitriomby, is 34 feet (10<sup>m</sup>4) high; Pointe Ambohitriomby attains an elevation of 198 feet (60<sup>m</sup>3). About 5½ cables south-south-westward of Rocher Rateau and 2½ cables offshore is a reef which dries 5 feet (1<sup>m</sup>5).

Baie d'Antsakoa is a small bay on the south-western side of Pointe Vilijany, about 1½ miles southward of Pointe Ambohitriomby; a rocky shoal, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies about 9 cables eastward of Pointe Ampanohara, the south-western entrance point of Baie d'Antsakoa, which is situated about 1½ miles south-westward of Pointe Vilijany.

Baie d'Ampasimena lies on the southern side of Pointe d'Ampangala, about 5½ cables southward of Pointe Ampanohara.

*Chart 708, plan of Ampasimena bay.*

Nosy Vazoana, 77 feet (23<sup>m</sup>5) high, an islet fringed by a coral reef, lies in the entrance to Baie d'Ampasimena, about one mile east-south-eastward of Pointe d'Ampangala; Récif Bevaoko, lying about midway

*Chart 708, plan of Ampasimena bay.*

between Nosy Vazoana and the coast, has a shoal bank extending about  $3\frac{1}{2}$  cables south-south-eastward of it.

*Chart 708, plan of Nosi Mitsio.*

- 5 Baie Alandrota is a small bay lying between Pointe Ampasimena-kély, about 2 miles southward of Pointe d'Ampangala, and Pointe Betamenaka, 237 feet (72<sup>m</sup>2) high, about 8 cables south-westward.

A shoal, with a depth of  $4\frac{1}{2}$  fathoms (8<sup>m</sup>7), coral, over it, lies about  $7\frac{1}{2}$  cables south-south-eastward of Pointe Betamenaka.

- 10 **Anchorage.**—The bays on the eastern side of Nosy Mitsio afford shelter during the north-west monsoon.

*Chart 708, plan of Ampasimena bay.*

Baie d'Ampasimena affords shelter from northerly winds; anchorage has been obtained with the western extremity of Nosy Vazoana (*Lat.*

- 15 12° 53' S., *Long.* 48° 39' E.) bearing 355° and Récif Bevaoko bearing 289°.

*Chart 708, plan of Nosi Mitsio.*

Anchorage can be obtained in Baie Alandrota in depths of 13 fathoms (23<sup>m</sup>8); it is well sheltered from northerly winds during the day, but

- 20 during the night the wind veers eastward causing a swell in the bay.

**Islets and dangers southward of Nosy Mitsio.**—Nosy Kajohy, 110 feet (33<sup>m</sup>5) high, which is connected with Pointe Sud, about  $7\frac{1}{2}$  cables north-westward, by a bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, is fringed by a coral reef.

- 25 Nosy Antaly, 215 feet (65<sup>m</sup>5) high, lying about  $6\frac{1}{2}$  cables south-south-eastward of Nosy Kajohy, has some vegetation near its summit; within one mile westward of this islet lie two above-water rocks, Nosy Heji and Nosy Paso, 10 and 7 feet (3<sup>m</sup>0 and 2<sup>m</sup>1) high, respectively, the vicinity of which is encumbered with rocks and shoals.

- 30 Nosy Maroni, 30 feet (9<sup>m</sup>1) high, lying about  $1\frac{1}{2}$  miles west-north-westward of Nosy Paso, is steep-to.

- Les Quatre Frères, a group of four islets, which are steep and resemble hayricks, lie within about 7 miles south-westward of Pointe Sud; it consists of Nosy Betaniazo, 284 feet (86<sup>m</sup>6) high, Nosy Betalinjona, 35 245 feet (74<sup>m</sup>7) high, Nosy Behangovo, 202 feet (61<sup>m</sup>6) high, and Nosy Antsoha (Ansoha); the latter islet is 162 feet (49<sup>m</sup>4) high. About midway between Nosy Betaniazo and Nosy Betalinjona lies a rock, 6 feet (1<sup>m</sup>8) high, and about 5 cables south-south-westward of the latter islet lies Roche Baleine, 3 feet (0<sup>m</sup>9) high. It is deep between the 40 islets, but about  $1\frac{1}{2}$  miles westward of Nosy Betaniazo lies Banc des Frères, with depths of 8 fathoms (14<sup>m</sup>6), rock, over it. This group should be approached with caution, as the area has not been thoroughly examined and there may be other dangers than those shown on the plan.

- 45 Nosy Toloho, 240 feet (73<sup>m</sup>1) high, lying about  $1\frac{1}{2}$  miles eastward of Nosy Antsoha, is steep-to, except off its south-eastern end. Nosy Karabo, 60 feet (18<sup>m</sup>3) high, lies about 9 cables eastward of Nosy Toloho and near the western end of a reef, which dries, and extends about  $2\frac{1}{2}$  cables east-north-eastward and eastward of it; a shallow 50 bank, on which lies a rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, extends about  $8\frac{1}{2}$  cables north-eastward of this reef.

- Tsitamperina, 136 feet (41<sup>m</sup>4) high, an islet about one mile south-south-westward of Nosy Antaly, lies on a shallow bank which extends about one cable northward and  $6\frac{1}{2}$  cables south-eastward and south- 55 ward of it.

*Charts 758, 2762, 597.*

*Chart 708, plan of Nosi Mitsio.*

Tsara Bajina, 210 feet (64<sup>m</sup>0) high, the southernmost islet of the group, lies about 1½ miles southward of Nosi Toloho; rocks, above water and sunken, extend about 5½ cables north-westward of this islet, and some above-water rocks lie about 2½ cables south-eastward of it. Daphne rock, with a depth of 5 feet (1<sup>m</sup>5) over it, lies about 7 cables northward of Tsara Bajina. 5

**Nosy Mangiho.**—Nosy Mangiho, 14 feet (4<sup>m</sup>3) high, about midway between Iles Mitsio and the coast, is flat, and lies on a reef, which dries, and extends about 4 cables north-westward and eastward of it; 10 a shoal, with a least depth of 4 fathoms (7<sup>m</sup>3), sand, over it, lies about 2 miles eastward of this islet.

*Chart 758.*

**Baie d'Ambaro.**—Baie d'Ambaro, the southernmost bight of the large bay between Cap St. Sébastien (*Lat.* 12° 25' S., *Long.* 48° 46' E.) 15 and Presqu'île d'Ambato, is entered between the mouth of Rivière Antoha and Nosy Faly, about 18 miles west-south-westward; the shores of the bay are low, with the exception of Mont Ambato, 1,493 feet (455<sup>m</sup>1) high, about 7 miles south-eastward of the north-western extremity of Presqu'île d'Ambato. This bay is exposed to northerly 20 and north-westerly winds, but is sheltered from westerly winds by Nosy Faly.

*Chart 706.*

**Island and dangers.**—**Light.**—Nosy Faly lies close northward of the northern end of Presqu'île d'Ambato, from which it is separated by a shallow channel only available for boats; it is 217 feet (66<sup>m</sup>1) high in its northern part, well cultivated, and higher than the peninsula southward of it. Rice is the principal industry of the island. 25

Nosy Faly is fringed in places by reefs, which dry, and extend as far as 7 cables offshore; some detached reefs lie as much as one mile from its eastern side. 30

A light is exhibited, at an elevation of 254 feet (77<sup>m</sup>4), from a grey octagonal tower, 25 feet (7<sup>m</sup>6) in height, situated on the summit of Nosy Faly. 35

*Chart 758.*

Banc Kirota, with a depth of 1½ fathoms (3<sup>m</sup>2) over it, lies about 8½ miles offshore and 11 miles east-north-eastward of Pointe de Namahory, the north-eastern point of Nosy Faly; Roche Binao, with a depth of 1½ fathoms (2<sup>m</sup>7), lies about 6½ miles east-north-eastward of the same point. A shoal, with a depth of 4½ fathoms (8<sup>m</sup>2), coral, lies about midway between Banc Kirota and Roche Binao. Roche Noir, about 4½ miles east-north-eastward of Pointe de Namahory, has a depth of 1½ fathoms (2<sup>m</sup>3) over it. 40

Banc des Etuis, with a least depth of one foot (0<sup>m</sup>3), coral, over it, lies about 7 miles offshore and 9½ miles eastward of Pointe de Namahory; this reef consists of two detached heads. 45

**Anchorage.**—There is good anchorage in Baie d'Ambaro, but it is open northward.

*Chart 706.*

**NOSSI-BÉ.**—**Aspect.**—**General remarks.**—Nossi-Bé (Nosi Bé), lying off a deep indentation in the north-western coast of Madagascar, between Nosy Faly and Pointe d'Angadoka, about 30 miles west- 50

*Chart 706.*

south-westward, is volcanic, and is much indented ; it can be identified from north-westward by the high land in the background.

Nosy Komba, which attains an elevation of 2,035 feet (620<sup>m</sup>3), and 5 can be seen from a distance of from 35 to 40 miles, lies close southward of Nossi-Bé.

Mont Lokobé, at the south-eastern end of Nossi-Bé, attaining an elevation of 1,487 feet (453<sup>m</sup>2), is the highest point of the island ; it is a granite peak, with deep ravines. The whole of this area is covered 10 with dense forest, and there are several peaks, a little lower than Mont Lokobé.

Pic du Tanylatsaka (*Lat. 13° 19' S., Long. 48° 14' E.*), 1,070 feet (326<sup>m</sup>1) high, about 7½ miles north-westward of Mont Lokobé, is the highest peak in the centre of Nossi-Bé ; other peaks of lesser elevation 15 in this vicinity have conspicuous craters.

Mont Andilah, 305 feet (93<sup>m</sup>0) high, about 4½ miles north-westward of Pic du Tanylatsaka, standing near the north-western extremity of Nossi-Bé, is rounded and wooded.

Mont Ankotaka, 679 feet (207<sup>m</sup>0) high, about 6 miles north-north- 20 eastward of Pic du Tanylatsaka, is the summit of the northern part of the island.

The inhabited and cultivated parts of this island are near the coast, especially where the shore is sandy and suitable for landing and hauling up native boats. The land generally is fertile. The rivers are mere 25 rivulets.

The island is not absolutely unhealthy, but fever is endemic, especially in the low marshy parts.

Hellville, at the southern end of the island, is the only port, but there are several anchorages which afford good shelter.

30 **Meteorological tables.**—See page 56.

**Outlying banks and dangers.**—Le Grand Serpent, a bank with a least depth of 33 feet (10<sup>m</sup>1) over it, extends about 4 miles north-north-westward from a position about 8½ miles northward of Nossi-Bé ; a bank, with a depth of 49 feet (14<sup>m</sup>9), the position of which is approxi- 35 mate, lies about 2½ miles westward of the northern end of Le Grand Serpent.

Banc Vert, with a least depth of 23 feet (7<sup>m</sup>0) over it, lies with its southern extremity about 7½ miles north-north-westward of Pointe d'Ampanassy, the western point of the northern coast of Nossi-Bé, 40 and extends about 3 miles north-eastward ; La Tortue, a bank with a least depth of 28 feet (8<sup>m</sup>5), lies about 1½ miles west-south-westward of the south-western end of Banc Vert, and Banc du Goliath, with a least depth of 36 feet (11<sup>m</sup>0), about three-quarters of a mile southward of the latter bank.

45 Le Crabe and Les Pleiades, shoals, with a least depth of 28 feet (8<sup>m</sup>5) over them, lie within a distance of about 7 miles north-westward of Pointe d'Andilah, the north-western extremity of Nossi-Bé, and close to the edge of the 100-fathom (182<sup>m</sup>9) line ; between these shoals and the north-western side of Nossi-Bé are several shoals, the positions 50 of which can best be seen on the chart.

Grand Banc de l'Entrée, the northern extremity of which is situated about 8½ miles westward of Pointe d'Andilah (*Lat. 13° 15' S., Long. 48° 11' E.*), extends about 8½ miles southward, and has a least charted depth of 23 feet (7<sup>m</sup>0) over it, but there may be less depths than are

*Charts 758, 2762, 597.*

**Chart 706.**

shown on the chart; some patches, with a least depth of 36 feet (11<sup>m</sup>0), lie between it and the coastal bank eastward.

Banc de Cinq Mètres, with a least depth of 16 feet (4<sup>m</sup>9) over it, lies about one mile southward of Grand Banc de l'Entrée, and extends about 2½ miles east-south-eastward; some banks, with a least depth of 39 feet (11<sup>m</sup>9), lie within 3½ miles west-south-westward and 3 miles southward of Banc de Cinq Mètres, and a shoal, with a depth of 32 feet (9<sup>m</sup>8), coral, lies about one mile north-eastward of the same bank.

**Caution.**—Vessels should not attempt to pass between any of these outer banks, or between them and Nossi-Bé. When passing the northern and western sides of this island, it should not be approached within a distance of 12 miles.

**Northern side.**—**Islet and dangers.**—Between Pointe d'Ankilahoa, the north-eastern extremity of Nossi-Bé, and Pointe d'Ampanassy, about 2 miles westward, the northern coast of the island is indented by two small bays, which dry; from Pointe d'Ampanassy the coast trends about 1½ miles west-south-westward to Pointe d'Amboday. The greater part of this coast is fringed by a reef, which extends 20 as far as 3 cables offshore.

A spit, with a least depth of 21 feet (6<sup>m</sup>4) at its north-eastern edge, extends about 2½ miles north-eastward of Pointe d'Ankilahoa; Rocher du Nord-Est, lying on this spit, about 1½ miles eastward of the point, is 14 feet (4<sup>m</sup>3) high, and a rock, about 6 cables northward of Rocher 25 Nord-Est, dries 4 feet (1<sup>m</sup>2).

Banc Erdwin, lying about 1½ miles north-eastward of Pointe d'Ampanassy, has a least depth of 5 feet (1<sup>m</sup>5) over it.

Nosy Fanihi, a square-shaped islet, 118 feet (36<sup>m</sup>0) high, about 1½ miles north-north-westward of Pointe d'Amboday, is fringed by 30 a coral reef, and surrounded by a shallow bank; it should be given a good berth. About midway between Nosy Fanihi and Banc Erdwin is a rocky shoal, with a depth of 4 feet (1<sup>m</sup>2) over it.

There are several shoal patches, with a least depth of 28 feet (8<sup>m</sup>5), lying within a distance of 2½ miles northward and westward of Nosy 35 Fanihi.

**Baie de Befotaka.**—**Islet and dangers.**—Baie de Befotaka is entered between Pointe d'Amboday and a promontory, of which Pointe d'Andilah is the western extremity, about 4 miles south-westward; the entrance to this bay is partially obstructed by rocks and shoals. 40 The shores of the bay are fringed in places by a reef, which dries.

Roche Guibert, about 1½ miles north-north-eastward of the south-western entrance point of Baie de Befotaka, with a depth of 5 feet (1<sup>m</sup>5) over it, lies at the southern end of a coral bank, which has a least depth of 31 feet (9<sup>m</sup>4), and extends about 2½ miles northward. 45

Antsoibery (*Lat. 13° 16' S., Long. 48° 12' E.*), a coral reef, on which stands a rocky islet, 86 feet (26<sup>m</sup>2) high, lies on the coastal bank, about 3 cables northward of the south-western entrance point of the bay; it is very shallow between Antsoibery and the coastal reef, and a bank, with a depth of 25 feet (7<sup>m</sup>6) over it, extends about 3 cables north- 50 north-westward of this rocky islet.

Roche Soa, with a depth of 3 feet (0<sup>m</sup>9) over it, lies about 1½ miles south-westward of Pointe d'Amboday and one mile offshore; a shoal, with a depth of 29 feet (8<sup>m</sup>8), lies about 2 cables north-north-westward

*Chart 706.*

of this rock, and a bank, with a least depth of 25 feet (7<sup>m</sup>6), extends about 5 cables southward of Roche Soa.

**Anchorage.**—There is an area, free from dangers, in about the centre of Baie de Befotaka, which affords anchorage in depths of from 8 to 11 fathoms (14<sup>m</sup>6 to 20<sup>m</sup>1), but the sea breeze is usually strong here and, blowing from north-westward into the open bay, causes a disagreeable swell.

**Western side.—Islets and dangers.**—From Pointe d'Andilah the coast trends about 9 miles south-south-eastward to Pointe du Cratère and is fringed by a reef, which extends as far as 8 cables offshore; the sea usually breaks over the reef fringing Pointe d'Andilah.

Banc d'Andilah, with a least depth of 20 feet (6<sup>m</sup>1) over it, lies about 9 cables west-north-westward of Pointe d'Andilah; the sea does not always break over this bank.

An islet lies close offshore, on the coastal reef, about 7 cables south-south-eastward of Pointe d'Andilah, and Nosy Roty, 138 feet (42<sup>m</sup>1) high, also lies on the coastal reef, about 6 cables southward of the former islet.

Banc de Dzamandzar extends about 2 miles from the coast, about 4 miles southward of Nosy Roty; on this bank are two patches, with depths of 12 and 17 feet (3<sup>m</sup>7 and 5<sup>m</sup>1) over them, respectively.

*Chart 2871.*

Nosy Tanga, 145 feet (44<sup>m</sup>2) high, lies at the edge of the coastal reef about 2½ miles north-westward of Pointe du Cratère; Roche d'Ambondro, with a depth of one foot (0<sup>m</sup>3) over it, lies about 5½ cables southward of this islet.

A reef, which dries, lies about 2 cables offshore, one mile west-north-westward of Pointe du Cratère.

Pointe du Cratère is covered with vegetation; on the south-western side of this point is a crater, with depths of 3½ fathoms (5<sup>m</sup>9), which a boat can enter under favourable conditions.

Banc Souzy (Suzi bank), lying about 7 cables southward of Pointe du Cratère, has a least depth of 5 fathoms (9<sup>m</sup>1) over it.

*Chart 706.*

**Off-lying island.**—Sakatia, a wooded island, 374 feet (114<sup>m</sup>0) high, the north-eastern point of which is situated about 2 miles southward of Pointe d'Andilah, lies about 4 cables offshore and, from the offing, appears to be part of the main island; it is fringed by a reef, and is separated from the coast eastward by a shallow channel. A spit, with depths of less than 60 feet (18<sup>m</sup>3) over it, extends about 1½ miles northward of the north-western side of Sakatia (*Lat.* 13° 18' S., *Long.* 48° 10' E.); a 29-foot (8<sup>m</sup>8) patch lies on this spit, about 6 cables west-north-westward of the north-western point of the island.

There is a leper asylum on Sakatia.

The banks and shoals westward and south-westward of Sakatia are described on pages 172-173.

**Anchorage.**—There is good anchorage in depths of from 9 to 11 fathoms (16<sup>m</sup>5 to 20<sup>m</sup>1), muddy clay, close off the south-eastern side of Sakatia; this anchorage is sheltered from all but westerly and south-westerly winds, which rarely blow here.

**Eastern side.—Dangers.—Beacons.**—Between Pointe d'Ankilahoa and Pointe Tafondro, about 12½ miles south-south-eastward, the coast is much indented.

*Charts 706, 758, 2762, 597.*

*Chart 706.*

The dangers north-eastward and eastward of Pointe d'Ankilahoa are described on page 173.

Cone d'Ambafaho, 155 feet (47<sup>m</sup>2) high, lies on the coast about 1½ miles southward of Pointe d'Ankilahoa. 5

Baie Tendraka is entered between Cone d'Ambafaho and Pointe d'Andranizany, 82 feet (25<sup>m</sup>0) high, about 2 miles south-south-eastward. Ile Tendraka, 184 feet (56<sup>m</sup>1) high, covered with trees, about 6 cables west-north-westward of Pointe d'Andranizany, divides this bay into two parts; the southern end of this island is connected with the main island westward by a ridge, which is dry at high water. The northern part of the bay is called Baie de Mahazandry; a village of the same name is situated on its north-western shore, but it is difficult of access. The greater part of the bay southward of Ile Tendraka dries; there is a village on the southern entrance point, where some provisions can be obtained. 10 15

Roche Larras, with a depth of 3 feet (0<sup>m</sup>9) over it, lies in the entrance to Baie Tendraka, about midway between Cone d'Ambafaho and Ile Tendraka.

Baie de Fascène is entered between a point about one mile south-south-eastward of Pointe d'Andranizany and Pointe de Berambo, about 2 miles further south-south-eastward; its shores are fringed, in places, by reefs, which extend as far as 5 cables offshore; the reef fringing the northern part of the bay extends as far as Pointe d'Andranizany. 20

Rocher Noir (Noie), 14 feet (4<sup>m</sup>3) high, lies about 3 cables offshore, about one mile north-westward of Pointe de Berambo. 25

The village of Fascène is situated on the southern shore of the bay. Communication with the shore is difficult, except at high water. Some fresh provisions can be obtained here.

*Charts 2871, 706.*

Baie d'Ambatozavavy is entered between Pointe Andranogoaka, about 2½ miles southward of Pointe de Berambo, and Pointe d'Ampassipohe, about 2 miles southward; the head of the bay dries out to a distance of about 6 cables, and there are depths of less than 3 fathoms (5<sup>m</sup>5) just within the entrance points. 30 35

*Chart 2871.*

A detached reef, which dries, lies about 2½ cables north-eastward of Pointe d'Ampassipohe (*Lat.* 13° 23' S., *Long.* 48° 22' E.).

Between Pointe d'Ampassipohe and Pointe Tafondro, 168 feet (51<sup>m</sup>2) high, the coast is fringed by a reef. 40

A spit, which dries out about 2½ cables, extends about 9 cables east-south-eastward from Pointe Tafondro, and has a depth of 4½ fathoms (8<sup>m</sup>7) at its eastern edge; from about the middle of the south-western side of this spit a bank, with a least depth of one fathom (1<sup>m</sup>8) over it, extends about 4 cables south-westward. 45

Two conical masonry beacons, painted red and white, each surmounted by a red and white square, stand on Pointe Tafondro, the front beacon at the southern extremity of this point and the rear beacon about 2 cables north-eastward of the front beacon.

*Chart 706.*

**Anchorage.**—Baie de Mahazandry affords good anchorage, in depths of from 46 to 59 feet (14<sup>m</sup>0 to 18<sup>m</sup>0), a little outside an imaginary line drawn from Cone d'Ambafaho to Pointe d'Andranizany. Care must be taken when anchoring here to avoid Roche Larras. 50

*Charts 706, 758, 2762, 597.*



*Chart 706.*

There is anchorage in the centre of Baie de Fascène in depths of 7 fathoms (12<sup>m</sup>8), mud or muddy sand ; the depths decrease suddenly, and there is usually a swell setting in.

5 *Charts 2871, 706.*

Anchorage can be obtained in depths of from 5½ to 7 fathoms (10<sup>m</sup>1 to 12<sup>m</sup>8), soft mud, about midway between the entrance points of Baie d'Ambatozavavy. The sea breeze is not felt here, but easterly winds are dangerous.

10 *Chart 2871.*

**Southern side.—Anse du Cratère.—Dangers.—Beacons.—**

**Buoys.**—Anse du Cratère, the entrance to which lies between Pointe du Cratère and Pointe Mahatsinjo (Mahatinzo), about 3 miles east-south-eastward, extends about one mile north-north-eastward ; the

## 15 head of the bay dries out to a distance of about 6 cables.

Pointe Mahatsinjo, 171 feet (52<sup>m</sup>1) high, is covered with vegetation.

The western shore of the bay is fringed by a reef. From the eastern side of the bay an extensive reef, consisting of rocks, shingle, and sand, which dries in parts, extends about one mile offshore and about 2 cables

20 southward of Pointe Mahatsinjo ; Ambariotsimaramara, a rock, 24 feet (7<sup>m</sup>3) high, lies on this reef, about 1½ miles west-north-westward of Pointe Mahatsinjo.

Banc Souzy, lying in the southern approach to Anse du Cratère, is described on page 174.

25 A spit extends about 1½ cables north-eastward from the north-eastern extremity of Pointe du Cratère, and near its extremity lies a rock, which dries 2 feet (0<sup>m</sup>6) ; this rock is marked on its south-eastern side by a red can buoy and on its south-western side by a red conical buoy ; another red conical buoy is moored about one cable

## 30 north-eastward of the rock.

Beacons are situated, one about 4 cables northward and another 2 cables north-eastward, respectively, of the north-eastern extremity of Pointe du Cratère (*Lat. 13° 24' S., Long. 48° 14' E.*).

35 **Caution.**—The positions, colours, and number of the buoys in this neighbourhood, cannot be depended upon.

**Anchorage.—Quay.**—Anse du Cratère affords anchorage, close under Pointe du Cratère, in depths of 9 fathoms (16<sup>m</sup>5), sheltered from westerly winds.

## 40 A quay, where vessels load sugar, extends from the western side of the bay, a little south of the village of Andampy, which is situated about half a mile northward of the southern extremity of Pointe du Cratère ; this quay is connected by a light railway with the sugar plantation.

## 45 There are two cranes on the quay, capable of lifting a seaplane of moderate tonnage, also some smaller cranes.

50 **Coast.—Dangers.—Buoys.—Light.—Beacons.**—Between Pointe Mahatsinjo and Pointe Lokobé, about 3 miles eastward, the coast recedes forming Rade d'Hellville (Great Road) ; its northern shore is indented by three small bays, of which, the centre, Anse du Plateau, is the only one frequented by shipping.55 Anse du Plateau is entered between a promontory, on which the town of Hellville is situated, and Pointe à la Fièvre, about 3½ cables eastward ; the latter point is hilly, attaining an elevation of 214 feet (65<sup>m</sup>2), and covered with vegetation, and a small jetty extends from its eastern side.

*Charts 706, 758, 2762, 597.*

*Chart 2871.*

The promontory, mentioned above, slopes steeply seaward, and there are numerous buildings on the sea front; the residency, with a flag-staff, is situated at the south-eastern end of the town.

The head of Anse du Plateau is filled with a reef, which dries in parts, and in which is an opening used as a boat harbour.

A reef, which dries in parts, extends about  $4\frac{1}{2}$  cables southward and  $1\frac{1}{2}$  cables east-south-eastward of the promontory, mentioned above.

A jetty extends east-south-eastward from the south-eastern extremity of the promontory to the edge of the coastal reef; on its northern side is a sea-wall, on which are some hangars and warehouses. Landing can be effected here.

A light is exhibited, at an elevation of 20 feet ( $6^m1$ ), from a red pillar, with a white base, situated on the head of this jetty.

A detached rocky shoal, with a depth of 8 feet ( $2^m4$ ) over it, lies about half a cable eastward of the head of the jetty.

Two beacons stand on the coast east-north-eastward of Hellville; the front beacon, a square masonry structure, 18 feet ( $5^m5$ ) in height, painted white with a black vertical stripe, is situated about  $4\frac{1}{2}$  cables north-eastward of Hellville light, and the rear beacon, a similar structure, 17 feet ( $5^m2$ ) in height, painted in black and white horizontal bands,  $2\frac{3}{4}$  cables north-north-eastward of the front beacon.

Baie Ambanoro, the easternmost of the three small bays indenting the northern shore of Rade d'Hellville, is encumbered with reefs and shoals, the southernmost of which has a depth of  $2\frac{1}{2}$  fathoms ( $4^m1$ ) over it, and lies about  $5\frac{1}{2}$  cables eastward of Pointe à la Fièvre (*Lat.  $13^\circ 24'$  S., Long.  $48^\circ 18'$  E.*); a narrow channel through these reefs leads to a jetty which extends south-south-westward from the village of Ambanoro at the head of this bay.

The eastern shore of Rade d'Hellville is fringed by a reef and shallow bank, on which lie some rocks, above water; this shallow bank extends as much as 2 cables offshore.

Pointe Lokobé is fringed by a coral reef, which dries, and extends about one cable southward of it.

Two masonry beacons stand near Pointe Lokobé; the front beacon about  $3\frac{1}{2}$  cables eastward of the point is painted white with a black vertical stripe; the rear beacon, on the coastal reef, about  $3\frac{1}{2}$  cables westward of the front beacon, is painted in black and white horizontal bands.

The area between Pointe Lokobé and Pointe Tafondro is encumbered with rocks and shoals, the positions of which can best be seen on the chart; amongst these may be mentioned an extensive shoal, with a least depth of 2 fathoms ( $3^m7$ ) over it, lying about one mile south-westward of Pointe Tafondro, and marked on its eastern side by a red conical buoy.

A black conical buoy marks a  $3\frac{1}{4}$ -fathom ( $5^m9$ ) patch lying about 6 cables south-south-eastward of Pointe Tafondro.

**Off-lying islands and dangers.**—**Lights.**—Tanykély (Tanikeli), an island lying about  $4\frac{1}{2}$  miles south-south-westward of Pointe Mahatsinjo, is conspicuous, and is fringed by a coral reef; it may be safely approached within a distance of one mile from any direction. A conspicuous rock lies close off the northern extremity of this island.

A light is exhibited, at an elevation of 197 feet ( $60^m0$ ), from a white

*Charts 706, 758, 2762.*

*Chart 2871.*

circular concrete tower with black horizontal bands, 26 feet (7<sup>m</sup>9) in height, situated on the summit of Tanykély.

Banc de l'Héloïse, with a depth of 4½ fathoms (7<sup>m</sup>8), coral, over it, lies about 2 miles eastward of Tanykély.

Nosy Komba, the northern extremity of which, Pointe Ambarion-aomby, is situated about 1½ miles south-south-westward of Pointe Tafondro, is a round well-wooded island, attaining an elevation in Antanianaomby, about 2½ miles southward of its northern extremity, of 2,035 feet (620<sup>m</sup>3); a sanatorium is situated on Anketsabé, at an elevation of 1,953 feet (595<sup>m</sup>3), about three-quarters of a mile north-westward of Antanianaomby. The village of Ampangorinana is situated on Pointe Ambarionaomby, and extends about a quarter of a mile south-eastward of it.

The coasts of Nosy Komba are precipitous; the southern side of the island is steep-to, but the other sides are fringed by a shallow bank, on which lie some rocks, with depths of less than 6 feet (1<sup>m</sup>8) over them.

A rocky islet lies close northward of Pointe Ambarionaomby, and a shoal, with a least depth of 4½ fathoms (7<sup>m</sup>8) over it, lies about 5 cables west-north-westward of it.

A reef extends about 4 cables north-eastward of Pointe Ambarion-aomby (*Lat. 13° 26' S., Long. 48° 21' E.*), and on this reef lies Ambariomena, an islet, 23 feet (7<sup>m</sup>0) high, and about one cable east-south-eastward of this islet Ambariomena-kély, a rock, which dries 8 feet (2<sup>m</sup>4).

Between Pointe Ambarionaomby and Ambariobé, an islet, 122 feet (37<sup>m</sup>2) high, about 1½ miles east-north-eastward, is a chain of rocks and shoals, some of which dry, the positions of which can best be seen on the chart.

Two 3-fathom (5<sup>m</sup>5) patches lie off the north-eastern side of Nosy Komba, about 6 and 9 cables south-south-westward, respectively, of the southern extremity of Ambariobé.

Several sunken rocks lie within a distance of 8 cables from the southern part of the eastern side of Nosy Komba; Récif d'Antamtamo, with a depth of 2 fathoms (3<sup>m</sup>7), coral, over it, is the southernmost of these rocks.

Ambariobé, mentioned above, and Ambariotélo, a group of rocky islets 2 cables north-westward, the highest 73 feet (22<sup>m</sup>3) high, lie on a detached reef which extends about 3½ cables west-north-westward of Ambariotélo and 3½ cables southward of Ambariobé; Rocher Sud (South rock), 10 feet (3<sup>m</sup>6) high, lies near the south-eastern end of this reef, about 1½ cables south-south-eastward of Ambariobé. The channels south-westward and northward of this reef should not be used.

Nosy Vorona, about 3 cables northward of Ambariotélo, near the centre of a shallow bank, is fringed by a reef; four rocks, which dry, lie on this bank within three-quarters of a cable northward and eastward of Nosy Vorona.

A light is exhibited, at an elevation of 52 feet (15<sup>m</sup>8), from a red iron column on gallows, 26 feet (7<sup>m</sup>9) in height, situated on the summit of Nosy Vorona.

**Tidal streams.**—The flood stream sets eastward and the ebb westward at rates of from half a knot to 1½ knots; in the channel between Nossi-Bé and Nosy Komba these streams attain a rate of from 2 to

*Chart 2871.*

2½ knots at springs. The turn of the tidal stream occurs from one to 2 hours before high and low water at Hellville.

**Passe Lokobé.**—**Directions.**—Passe Lokobé, between Nosy Komba and the south-eastern end of Nossi-Bé, can be used by vessels proceeding from the eastern side of Nossi-Bé to the southern side of that island or vice-versa.

*Charts 2871, 706.*

A vessel intending to use this pass, coming from westward, should steer with Pointe Ambarionaomby in line with Mont Ambato (page 171), bearing about 073°, passing northward of Tanykély, when she should bear northward, bringing Nosy Vorona to bear 076°, and steer for it on that bearing, until the beacons on Pointe Tafondro are in line, bearing 040°, when course should be altered north-eastward keeping these beacons in line and the summit of Les Deux Sœurs (*Lat. 13° 46' S., Long. 48° 05' E.*), a mountain with two peaks, the highest of which is 2,454 feet (748<sup>m</sup>0) high, situated about 19 miles south-south-westward of Tanykély, astern, bearing about 218°, a little open north-westward of the north-western extremity of Nosy Komba. This latter course leads north-eastward of the red conical buoy marking the eastern side of the extensive shoal, with a least depth of 2 fathoms (3<sup>m</sup>7), one mile south-westward of Pointe Tafondro.

A sharp alteration of course eastward is now required to bring the beacons near Pointe Lokobé in line, astern, bearing 264°; this course, which leads close northward of the black conical buoy marking the 3½-fathom (5<sup>m</sup>9) patch 6 cables south-south-eastward of Pointe Tafondro, should be held until the eastern extremity of Nosy Komba is in line with the eastern peak of Massif d'Ankify, 1,257 feet (383<sup>m</sup>1) high, about 5 miles southward, bearing 190°, when a vessel will be through the pass, and course can be altered northward or southward.

A vessel coming from northward should pass along the eastern side of Nossi-Bé, and bring the eastern extremity of Nosy Komba in line with the eastern peak of Massif d'Ankify, bearing 190°, steering on this transit until the southern extremity of Tanykély is in line with Nosy Vorona, bearing about 244°, when course should be altered westward into Passe Lokobé, and a vessel can proceed through this pass, reversing the directions given above for a vessel coming from westward.

**Directions.**—**Anchorage.**—Small vessels bound for an anchorage off Hellville can pass through Passe Lokobé.

Coming from westward a vessel should pass southward of Banc de Cinq Mètres; Mont Lokobé (page 172), bearing 084°, leads about one mile southward of this bank.

*Chart 2871.*

Vessels can anchor off the southern coast of Nossi-Bé, westward of Nosy Komba, in depths of from 8 to 13 fathoms (14<sup>m</sup>6 to 23<sup>m</sup>8), sand, or muddy sand, good holding ground; it is well sheltered here from all but westerly winds.

The most used anchorage is in the vicinity of an imaginary line joining Pointe à la Fièvre and the southern extremity of the reef extending southward of Hellville (*see* page 177). Large vessels can anchor with Hellville light-structure in line with Antorotoro, a peak, 496 feet (151<sup>m</sup>2) high, about 1½ miles north-north-westward, bearing 335°, and Pointe Lokobé in line with the rocky islet close northward of

*Charts 706, 758, 2762, 597.*

*Chart 2871.*

Pointe Ambarionaomby, bearing  $114^{\circ}$ ; this anchorage is well sheltered, but winds from between west-south-west and west cause a swell in Rade d'Hellville.

- 5 The anchorage in the small bay westward of Anse du Plateau is a little more sheltered from a westerly swell, but communication with the shore is almost impossible as boats have to round the southern extremity of the reef mentioned above in order to reach the jetty.

There is anchorage for small vessels in Anse du Plateau in depths  
10 of from  $4\frac{1}{2}$  to  $5\frac{1}{2}$  fathoms ( $8^m7$  to  $10^m1$ ), eastward of the jetty; the two beacons east-north-eastward of Hellville (*Lat.*  $13^{\circ} 24' S.$ , *Long.*  $48^{\circ} 17' E.$ ), in line, bearing  $018^{\circ}$ , lead through the fairway towards this anchorage.

Coasting vessels with local knowledge can anchor as convenient off  
15 the village of Ambanoro.

**Port limits.**—The limits of the port are as follows:—

From the southern side of the root of Hellville jetty, a line drawn in a  $180^{\circ}$  direction for a distance of about  $4\frac{1}{2}$  cables, thence in a  $270^{\circ}$  direction for  $7\frac{1}{2}$  cables, thence in a  $180^{\circ}$  direction for  $7\frac{1}{2}$  cables, thence  
20 in an  $090^{\circ}$  direction for  $19\frac{1}{2}$  cables, thence in an  $000^{\circ}$  direction for  $10\frac{1}{2}$  cables, thence in a  $270^{\circ}$  direction for  $6\frac{1}{2}$  cables and thence in a  $315^{\circ}$  direction for about three-quarters of a cable to the high water line at the south-western extremity of Pointe à la Fièvre.

**Hellville.**—Hellville, with a population, in 1942, of about 3,500,  
25 is the capital of Nossi-Bé. The Custom house stands near the landing place.

Fresh provisions are obtainable, and water is laid on to the jetty; water can be supplied by means of water-boats to vessels lying within about a quarter of a mile of the jetty.

- 30 There is one 2-ton crane and one smaller one.

Tugs and lighters are available.

There is a small hospital here.

**Communications.**—There is steamer communication with the other Madagascan ports, also with Iles Comores, Zanzibar, Muscat, and  
35 Bombay.

Hellville is connected with the telegraph system of Madagascar.

**Signal station.**—**Storm signals.**—A signal station and a look-out stand on the summit above Pointe Mahatsinjo.

Signals indicating the locality threatened by a cyclone, *see* page  
40 27, are displayed at Hellville.

**Trade.**—The principal exports are sugar, rum, alcohol, pepper, vanilla, coffee, and essences for perfume.

*Chart 706.*

**COAST.**—**Aspect.**—**Dangers.**—Between Pointe d'Andemby, the  
45 north-western extremity of Nosy Faly, and Ankify, about 15 miles north-south-westward, the coast forms Baie de Tsimipaika.

Mont Ambato, about  $5\frac{1}{2}$  miles south-south-eastward of Pointe d'Andemby, was mentioned on page 171. Within Ankify the land rises to Massif d'Ankify (page 179), about  $1\frac{1}{2}$  miles southward; this  
50 summit is the eastern extremity and highest point of a range which extends about  $1\frac{1}{2}$  miles westward.

Nosy Komba is described on page 178.

The eastern shore of Baie de Tsimipaika is fringed by a shallow

*Charts 706, 758, 2762, 597.*

*Chart 706.*

bank, which extends as far as  $2\frac{1}{2}$  miles offshore ; the head and southern shore of the bay is encumbered with banks which dry, and a bank, with depths of less than 5 fathoms ( $9^m1$ ) over it, extends to within about three-quarters of a mile of the south-eastern end of Nosy Komba, 5 the southern and south-eastern ends of which island are fringed by a similar bank extending as far as half a mile offshore.

La Lanterne, a detached rock, with a least depth of 8 feet ( $2^m4$ ), coral, over it, lies about  $5\frac{1}{2}$  miles south-westward of Pointe d'Ambahivavy, the north-western extremity of Presqu'île d'Ambato, and 10 about midway between the latter peninsula and Nosy Komba.

A rock, which dries 12 feet ( $3^m7$ ), lies about 2 cables offshore, 4 miles southward of Pointe d'Ambahivavy (*Lat.  $13^\circ 22'$  S., Long.  $48^\circ 29'$  E.*).

Ambato Rano, a rock, 40 feet ( $12^m2$ ) high, lies at the south-eastern extremity of a shoal, with a depth of 7 feet ( $2^m1$ ) over it, situated 15 about  $2\frac{1}{2}$  miles east-north-eastward of Ankify ; shoals, with depths of 18 and 21 feet ( $5^m5$  and  $6^m4$ ), lie about  $1\frac{1}{2}$  and  $1\frac{1}{2}$  miles, respectively, northward of Ambato Rano, and a shoal, with a depth of 14 feet ( $4^m3$ ), about  $1\frac{1}{2}$  miles westward of the same rock.

Rivière Antsahampana flows into the sea on the eastern side of 20 Ankify ; it is accessible, only at high water, to small vessels with local knowledge drawing not more than 5 feet ( $1^m5$ ). There is a boat harbour and quay at the village of Antsahampana.

Ankify can be identified by a large isolated rock, which lies immediately northward of the point ; some buildings and a flagstaff are situ- 25 ated on the eastern side of this point.

**Tidal streams.**—In the passage between Nosy Komba and the mainland the tidal streams are strong, especially at the turn of the streams, attaining a rate of  $2\frac{1}{2}$  knots at springs. If it is blowing fresh at this time the sea gets up quickly, and landing becomes difficult. 30

**Anchorage.**—There is anchorage off Ankify in depths of from  $5\frac{1}{2}$  to  $6\frac{1}{2}$  fathoms ( $10^m1$  to  $11^m9$ ), sand, gravel, and coral, with the eastern peak of Massif d'Ankify bearing  $177^\circ$  and the isolated rock close northward of Ankify bearing  $240^\circ$ .

The best landing place is a little westward of the flagstaff on Ankify. 35

**Baie d'Ampasindava.—Aspect.**—Massif d'Ankify slopes steeply westward to the coast, where it forms Pointe d'Antaimpitily, which is the eastern entrance point of Baie d'Ampasindava ; the western entrance point, Pointe d'Anjanozano, is hilly, attaining an elevation of 348 feet ( $106^m1$ ), and is situated about 11 miles west-south-westward 40 of Pointe d'Antaimpitily.

*Charts 706, 758.*

The mountains inland, eastward and southward of Baie d'Ampasindava, vary from about 1,000 to 7,000 feet ( $304^m8$  to  $2,133^m6$ ) in elevation ; the summits on the western side of the bay are more regular 45 and lower, attaining an elevation, in Les Deux Sœurs (page 179), of 2,454 feet ( $748^m0$ ) ; this latter mountain is also known as Mont Ambohimirahavavy.

*Chart 706.*

The eastern shore of Baie d'Ampasindava is low, and indented by 50 the estuaries of several rivers ; it is fringed by a bank, which dries, and extends as far as a mile offshore. Rivière Sambirano flows into the bay about  $8\frac{3}{4}$  miles southward of Pointe d'Antaimpitily.

The mountains slope steeply towards the coast on the southern and

*Charts 758, 2762, 597, 748a, 748b.*

*Chart 706.*

western sides of the bay, the shores varying from about 300 to 1,000 feet (91<sup>m</sup>4 to 304<sup>m</sup>8) in height; a bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, extends about 1½ miles from the southern shore of the bay. Mailaka, a large village, stands on the southern shore, about one mile east-south-eastward of Pointe Ambodimadiro, a hilly point, 325 feet (99<sup>m</sup>1) high, about 16 miles south-south-westward of Pointe d'Antaimpitily.

**Islets and dangers.**—Banc d'Antaimpitily, lying about 1½ miles north-westward of Pointe d'Antaimpitily (*Lat.* 13° 33' S., *Long.* 48° 20' E.), has a depth of 15 feet (4<sup>m</sup>6) over it; a rocky shoal, with a depth of 31 feet (9<sup>m</sup>4), and two 36-foot (11<sup>m</sup>0) patches, lie about one mile north-north-eastward and 1½ and 1½ miles northward, respectively, of Banc d'Antaimpitily.

Banc du Touareg, with a least depth of 6 feet (1<sup>m</sup>8) over it, lies about 4 miles westward of Pointe d'Antaimpitily; within a distance of about 2 miles south-south-eastward, 2½ miles south-south-westward, and 2½ miles westward, respectively, of Banc du Touareg, are some shoals and banks, with a least depth of 29 feet (8<sup>m</sup>8).

*Chart 706, with plan of Nosi Mamoko anchorage.*

A group of islets and rocks are situated on the western side of the bay, about 6 miles south-south-eastward of Pointe d'Anjanozano and half a mile offshore. Noky Kely and Noky Lolo, the two northern islets, 161 and 168 feet (49<sup>m</sup>1 and 51<sup>m</sup>2) high, respectively, lie on a reef, with depths of less than 6 feet (1<sup>m</sup>8) over it, and which extends about three-quarters of a mile north-north-westward and a quarter of a mile southward of them; two rocks, each with a depth of less than 6 feet (1<sup>m</sup>8), lie between the coastal reef and the north-western end of the reef surrounding Noky Kely and Noky Lolo.

Noky Mamoko, 296 feet (90<sup>m</sup>2) high, the southern islet of this group, about three-quarters of a mile south-eastward of Noky Lolo, is wooded; it is fringed by a coral reef, except on its western side.

There is a narrow navigable channel, with depths of from 6 to 7 fathoms (11<sup>m</sup>0 to 12<sup>m</sup>8) in it, between Noky Mamoko and Noky Lolo.

**Anchorage.**—Baie d'Ampasindava is too open to afford shelter, but secure anchorage may be found within Noky Mamoko.

*Chart 706, plan of Nosi Mamoko anchorage.*

The best berth is in depths of from 39 to 46 feet (11<sup>m</sup>9 to 14<sup>m</sup>0), mud, westward of Noky Mamoko, which may be approached either northward or southward of that islet.

*Chart 706.*

Fresh provisions may be obtained at any of the anchorages.

**Coast.—Islet and dangers.**—Between Pointe d'Anjanozano and Cap Makamby, about 2½ miles west-north-westward, the coast is fringed by a bank, which dries, and which extends as far as 4 cables offshore.

*Chart 706, with plan of Kisimani anchorage.*

A reef, which dries, extends about 2 miles north-north-westward of Cap Makamby, and lying just within its north-western extremity is Noky Kisimany, 295 feet (89<sup>m</sup>9) high; there are several above-water rocks on this reef.

Baie d'Ambararata, on the western side of this reef, is a well sheltered natural harbour; Rivière Kongony flows into the southern and

*Charts 706, 705, 758, 2762, 597.*

*Chart 706, with plan of Kisimani anchorage.*

Rivière Maropapango into the western part of this bay. The village of Ampasimena, with a flagstaff, is situated on the mainland westward of Nosy Kisimany.

Roche du Confluent, with a least depth of one foot (0<sup>m</sup>3) over it, lies about 4 cables south-south-eastward of Pointe du Rocher, a promontory, 238 feet (71<sup>m</sup>0) high, about 1½ miles south-eastward of the village of Ampasimena.

*Charts 707, 705, 706.*

From Pointe du Rocher the coast trends about 3½ miles north-north-westward to Pointe d'Ampoahana (*Lat.* 13° 31' S., *Long.* 48° 04' E.) and thence about 2½ miles westward to Pointe Makamby; a bank, which dries, fringes the coast between Pointe du Rocher and Pointe d'Ampoahana, and at the edge of this bank, about 3½ cables south-south-eastward of Pointe d'Ampoahana is a rock, which dries 11 feet (3<sup>m</sup>4).

*Chart 707.*

A reef, which dries, fringes the coast between Pointe d'Ampoahana and Pointe Makamby, extending about 4½ cables north-north-westward of the latter point.

*Chart 706, with plan of Kisimani anchorage.*

**Anchorage.**—Baie d'Ambararata affords anchorage to moderate-sized vessels a little within the entrance, in depths of from 42 to 49 feet (12<sup>m</sup>8 to 14<sup>m</sup>9); the edge of the reef fringing Pointe du Rocher should be marked before entering.

Cattle and poultry can be obtained here. Game is abundant, and net fishing is possible.

*Chart 707.*

**Baie d'Ambavatoby.**—**Aspect.**—Baie d'Ambavatoby is entered between Pointe Makamby and Pointe Antsiraka, about 6½ cables westward; the entrance may be identified by two hills of greyish colour, which overlook the entrance points. From the offing the peninsula on the western side of the entrance appears like a group of islands.

L'Arbre Mort, a hill, 453 feet (138<sup>m</sup>1) high, about 2½ miles east-south-eastward of Pointe Makamby, and Sommet de la Compagnie (Campagnie hill), 480 feet (146<sup>m</sup>3) high, about 1½ miles westward of Pointe Antsiraka, are conspicuous.

The shores of this bay, deeply indented, form three smaller bays, viz., Baie d'Amboahangy, on the eastern side, Baie d'Andassy-Bé, on the western side, and Baie d'Androfiabé, at the head of Baie d'Ambavatoby.

The principal village, Andassy-Bé, is situated about half a mile westward of Pointe Antsiraka; there are two flagstaffs in the village, and another stands on a hill on the coast about half a mile south-westward of the village.

**Islet and dangers.**—Pointe Makamby is fringed by a reef which dries, and which extends about 4½ cables north-north-westward and 1½ cables westward of it; Pointe Antsiraka is fringed by a narrow reef, and vessels can pass about 1½ cables eastward of it. A shallow bank extends about 2 cables southward of the latter point.

Pointe Amboaboaka, the southern entrance point of Baie d'Andassy-Bé, is fringed by a reef which dries, and a spit, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, extends about 3½ cables north-westward of

*Charts 706, 705, 758, 2762, 597.*



*Chart 707.*

this point ; Dalrymple rock, awash, lies just within the north-western extremity of this spit. The head of Baie d'Andassy-Bé is encumbered with reefs and shoals, many of which dry.

- 5 Ile Verte, 89 feet (27<sup>m</sup>1) high, about 4½ cables east-north-eastward of Pointe Marolay, the southern entrance point of Baie d'Amboahangy, lies on a coral reef, which dries, and which extends about 2½ cables north-north-westward of it ; a rocky shoal, with a depth of 2½ fathoms (5<sup>m</sup>0) over it, lies about 2½ cables north-eastward of the northern  
10 extremity of Ile Verte, and a rock, which dries 2 feet (0<sup>m</sup>6), about 3½ cables east-north-eastward of the southern extremity of the same islet.

- Pointe des Maques (*Lat. 13° 33' S., Long. 48° 03' E.*), about 1½ miles south-eastward of Pointe Makamby, is a rocky isthmus, terminating  
15 in a rock, which dries 3 feet (0<sup>m</sup>9) ; a shoal, with a depth of 2½ fathoms (5<sup>m</sup>0) over it, lies about one cable southward of this point.

*Charts 707, 706.*

- Directions.—Anchorages.**—The entrance channel, between the 5-fathom (9<sup>m</sup>1) lines, is 2 cables wide. The depression between the  
20 peaks of Les Deux Sœurs (page 179), bearing 162°, just open eastward of Pointe Marolay, leads through the entrance in a least depth of 12 fathoms (21<sup>m</sup>9). *See view below.* This alignment passes through Pic Dénudé, which is situated about 4 miles south-south-westward of l'Arbre Mort.



The depression between Les Deux Sœurs just opens eastward of Pointe Marolay, bearing 162°.

(Original dated prior to 1934.)

*25 Chart 707.*

- Baie d'Andassy-Bé is recommended as a secure anchorage, but Baie d'Amboahangy has the advantage of a fresh sea-breeze, which keeps off mosquitoes and other insects ; both these bays offer spacious anchorage in depths of from 6 to 9 fathoms (11<sup>m</sup>0 to 16<sup>m</sup>5), mud, or  
30 sand and mud.

Baie d'Androfiabé has less swinging room, and there are shoals in the entrance to this bay, with a least depth of 4 fathoms (7<sup>m</sup>3).

- In 1923 the *Bellatrix* anchored with a small rock at the southern end of the beach fronting the village of Andassy-Bé in line with Sommet  
35 de la Compagnie, bearing 287°, and Pointe Antsiraka 040°.

Cattle, poultry, eggs, milk, and sweet potatoes can be obtained from the village of Andassy-Bé. The hills surrounding this bay abound in guinea-fowls. Fish is plentiful.

- Coast.—Off-lying island.**—From Pointe Antsiraka the coast  
40 trends about 2½ miles north-westward to Pointe d'Angadoka, and is fringed by a reef which dries, and which extends about 2 cables north-eastward of Pointe d'Angadoka.

Ile Ankaxoberavina (Ankasoberavina), 204 feet (62<sup>m</sup>2) high, lying about 9 cables north-north-eastward of Pointe d'Angadoka, is covered

*Charts 706, 705, 758, 2762, 597.*

*Chart 707.*

with brushwood, and when seen from south-westward appears as two islets; it is fringed by a reef and shallow bank.

A coral bank, with a least depth of  $4\frac{1}{2}$  fathoms (8<sup>m</sup>2) over it, lies about midway between the mainland and Ile Ankaxoberavina (*Lat.* 5 13° 29' S., *Long.* 47° 59' E.).

*Charts 706, 705, 758, 2762.*

## CHAPTER VII

MADAGASCAR, NORTH-WESTERN COAST—POINTE D'ANGADOKA TO  
CAP SAINT-ANDRÉ*Chart 758.*

**OUTER REEF.**—Between Pointe d'Angadoka (*Lat. 13° 30' S., Long. 47° 59' E.*) and Cap Saint-André, about 260 miles south-westward, the coast forms a bay. A coral reef, with patches of sand and weed, lies parallel with the coast, and from 5 to 15 miles offshore; it consists of a chain of shoals and forms a barrier with some deep passages through it, and except for some shoal heads westward of Iles Radama, about 28 miles south-south-westward of Pointe d'Angadoka, vessels drawing less than 12 feet (3<sup>m</sup>7) can pass over it in fine weather. Over the whole of this barrier the water is so clear that the bottom can be seen in depths of 16 fathoms (29<sup>m</sup>3), and the outer edge, where the depths increase very rapidly seaward, is distinctly indicated by the change in the colour of the water. *See also page 145.*

The description of the outer reef is continued on page 201.

**Caution.**—Owing to the irregular nature of the bottom and the comparative scantiness of the soundings on the banks, shoals may exist which are not shown on the chart.

**LOCAL WEATHER.**—*See pages 48-51.*

*Chart 705.*

**COAST.**—**Islet and dangers.**—From Pointe d'Angadoka the coast trends about 4½ miles south-south-westward to Pointe Andrahibo and is fringed in places by a reef; a bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it, extends as far as about one mile offshore.

*Chart 707.*

Nosy Antsoha, 188 feet (57<sup>m</sup>3) high, lying on the coastal bank, about 6½ cables south-westward of Pointe d'Angadoka, is covered with vegetation; it is fringed by a reef, which extends to within less than a cable of the coastal reef.

A small village is situated on the coast eastward of Nosy Antsoha.

Mont Dupuis, 476 feet (145<sup>m</sup>1) high, is situated near the coast, about 1½ miles southward of Nosy Antsoha.

*Charts 707, 705.*

A detached shoal, with a depth of three-quarters of a fathom (1<sup>m</sup>4), coral, over it, lies about 6 cables south-westward of Nosy Antsoha.

From a point 6 cables west-south-westward of Mont Dupuis the coast recedes forming a small bay between it and Pointe Andrahibo; this bay is filled with the coastal reef, which dries.

*Charts 705, 758, 2762, 597, 748a, 748b.*

*Chart 705.*

A shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ), coral, lies about  $1\frac{1}{2}$  miles north-westward of Pointe Andrahibo.

**Off-lying islet and shoals.**—Nosy Kivinjy, 338 feet ( $103^m0$ ) high, lying about one mile westward of Pointe d'Angadoka, is conical-shaped, with nearly perpendicular sides, and an inaccessible summit covered with brushwood; it is conspicuous from westward. A bank, with a depth of  $2\frac{1}{2}$  fathoms ( $5^m0$ ) over it, extends about  $1\frac{1}{2}$  cables eastward of it. 5

There is a navigable channel between Nosy Kivinjy and Nosy Antsoha (*Lat.*  $13^\circ 31' S.$ , *Long.*  $47^\circ 58' E.$ ); a vessel using it should keep on the north-western side of the channel. 10

Shoals, with depths of 7 and  $6\frac{1}{2}$  fathoms ( $12^m8$  and  $11^m9$ ), lie about  $2\frac{1}{2}$  miles west-south-westward and 3 miles south-westward, respectively, of Nosy Kivinjy. 15

**Baie Kakambana.—Dangers.**—Baie Kakambana is entered between Pointe Andrahibo and Pointe Antangena, about  $2\frac{1}{2}$  miles west-south-westward. A river of the same name flows into the head of this bay; the entrance to it is blocked by rocks and it is only navigable by boats at high water. 20

The villages of Amporaha and Marotony (Morotonge) are situated on the eastern and southern shores of this bay, respectively.

Pointe Andrahibo is a long narrow tongue of land, on which are three hillocks covered with trees; the coastal reef, which dries, extends about  $6\frac{1}{2}$  cables north-westward and 5 cables westward of this point. 25

Pointe Antangena is nearly steep-to on its western side; a detached shoal, with a depth of  $4\frac{1}{2}$  fathoms ( $8^m2$ ), coral, over it, lies about  $1\frac{1}{2}$  miles north-north-westward of this point.

The southern side of Baie Kakambana is fringed by a reef which dries, and which extends as far as 6 cables offshore; a bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, extends about 3 cables beyond the edge of this reef, about 3 cables from the northern side of the bay, and about 7 cables from the eastern side. 30

Rocher Kiboaboa (Kibuboa rock), lying on the coastal bank, at the head of the bay, dries; a rock, with a depth of less than 6 feet ( $1^m8$ ) over it, lies about 6 cables westward of Rocher Kiboaboa. 35

**Anchorage.**—Baie Kakambana is sheltered, except from north-westward, and offers anchorage to small vessels; the best berth is, about 5 cables south-south-eastward of Pointe Andrahibo, in depths of  $3\frac{1}{2}$  fathoms ( $6^m4$ ), muddy sand, good holding ground. 40

**Coast.—Aspect.**—From Pointe Antangena the coast trends about 7 miles southward to the entrance to Rivière Baramahamay and is fringed by a reef which dries; it is backed by hillocks, covered with trees, on which show patches of bright red. Caution is necessary in approaching this part of the coast on account of the off-lying shoals. 45

Andrano Miserano, situated about  $6\frac{1}{2}$  miles south-eastward of Pointe Antangena, is a massive mountain, 2,244 feet ( $684^m0$ ) high, entirely covered with trees; this mountain, Les Deux Sœurs (page 179), and Berahodo or Sommet Porte, 2,306 feet ( $702^m9$ ) high, about  $9\frac{1}{2}$  miles southward of Les Deux Sœurs, are excellent landmarks, visible from a distance of about 60 miles in clear weather. 50

The village of Antampolo is situated on the coast about 2 miles northward of the entrance to Rivière Baramahamay.

Rivière Tatezambato (Tetezambato river) flows into Rivière Barama-

*Chart 705.*

hamay, about 2 miles within the entrance to the latter river ; a village, with a flagstaff, is situated on the southern bank of Rivière Baramahamay, about 6 cables east-south-eastward of the southern entrance point.

A detached shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m1$ ), lies about  $3\frac{1}{2}$  cables eastward of the southern entrance point (*Lat.*  $13^\circ 43' S.$ , *Long.*  $47^\circ 54' E.$ ) of Rivière Baramahamay.

**Anchorage.**—There is well sheltered anchorage, except from 10 westerly winds, near the mouth of Rivière Baramahamay, for small vessels with local knowledge ; there is room for one vessel, northward of the village, in depths of  $6\frac{1}{2}$  fathoms ( $11^m9$ ). Small craft with local knowledge can anchor in the basin about half a mile farther up the river ; the coastal bank in this vicinity dries. A vessel making these 15 anchorages must keep near the centre of the narrow entrance channel.

Boats can ascend either river.

**Off-lying island.**—**Light.**—**Dangers.**—Nosy Iranja, 201 feet ( $61^m5$ ) high, lying about  $4\frac{1}{2}$  miles westward of Pointe Antangena, consists of two parts separated by a low neck. The eastern end of this 20 island is clifty and covered with vegetation ; the northern end is lower, barren, and of a reddish colour, with a chain of red rocks extending towards the centre of the island and to its summit. A sandy, thickly wooded islet, about 8 cables south-south-eastward of Nosy Iranja, is connected with it by a sandy ridge which dries. These islands lie on 25 the eastern side of a bank, with depths of less than 5 fathoms ( $9^m1$ ) over it ; and which extends about one mile westward of them ; a 5-fathom ( $9^m1$ ) patch lies about three-quarters of a mile west-north-westward of the northern extremity of Nosy Iranja.

A light is exhibited, at an elevation of 221 feet ( $67^m4$ ), from a white 30 metal tower, 59 feet ( $18^m0$ ) in height, situated at the south-eastern end of Nosy Iranja.

Ambatomilay, a detached rock, 34 feet ( $10^m4$ ) high, and another above-water rock about 2 cables eastward, lie about 5 cables southward of the western extremity of Nosy Iranja ; when seen from a 35 distance westward Ambatomilay appears like a boat under sail between the two islands.

A shoal, with a least depth of  $4\frac{1}{2}$  fathoms ( $8^m7$ ) over it, lies about  $1\frac{1}{2}$  miles south-westward of Ambatomilay.

A shoal, with a least depth of  $3\frac{1}{2}$  fathoms ( $6^m4$ ) over it, the northern 40 extremity of which is situated about 2 miles westward of Pointe Antangena, extends about  $1\frac{1}{2}$  miles southward ; a 5-fathom ( $9^m1$ ) patch lies about 4 cables westward of the southern part of this shoal.

Shoals, with least depths of  $2\frac{1}{2}$  fathoms and half a fathom ( $4^m6$  and 45  $0^m9$ ) over them, lie about  $1\frac{1}{2}$  and  $1\frac{1}{4}$  miles north-westward, respectively, of the northern entrance point of Rivière Baramahamay.

**Coast.**—**Aspect.**—From the southern entrance point of Rivière Baramahamay, the coast trends about  $3\frac{1}{2}$  miles south-south-westward to Pointe Komamery, and thence about  $2\frac{1}{2}$  miles south-south-eastward 50 to the entrance to the river Andranomanilika, which flows into the sea over a rocky bed.

Between the southern entrance point of the river Andranomanilika and Pointe Sangajira, about 5 miles southward, the coast is clifty, alternated with sandy beaches.

*Charts 758, 2762, 597.*

*Chart 705.*

Pointe Sangajira (*Lat.*  $13^{\circ} 54' S.$ , *Long.*  $47^{\circ} 54' S.$ ) is the south-western extremity of a hill which slopes gently towards the coast.

This stretch of coast is fringed by a coral reef, and there are several off-lying shoals necessitating caution when approaching it. 5

For aspect *see* also pages 187-188.

**Off-lying dangers.**—A bank, with depths of less than 10 fathoms ( $18^m3$ ) over it, the south-eastern end of which is situated about 6 cables north-westward of Pointe Komamery, extends about  $1\frac{1}{2}$  miles north-westward; on the south-eastern part of this bank are two coral patches, with depths of  $3\frac{1}{2}$  and  $2\frac{1}{2}$  fathoms ( $6^m4$  and  $5^m0$ ), respectively. 10

Vestal reef, the north-western part of which dries, lies about  $1\frac{1}{2}$  miles westward of Pointe Komamery.

There are many other dangers lying between Vestal reef and Nosy Kalakajoro, the northernmost island of the Radama group, about  $10\frac{1}{2}$  miles south-south-westward, the positions of which can best be seen on the chart. 15

**ILES RADAMA.—Aspect.—Dangers.**—This group which, in clear weather, is visible from 20 to 25 miles seaward, consists of four islands, Nosy Kalakajoro, Nosy Ovy, Antany Mora, and Nosy Valiha, 20 lying between the outer reef and the mainland. These islands are mostly covered with grass and trees; all, except Antany Mora, are inhabited.

Nosy Kalakajoro, 538 feet ( $164^m0$ ) high, the northern extremity of which is situated about  $7\frac{1}{2}$  miles west-south-westward of Pointe 25 Sangajira, is almost steep-to on its eastern side, but its western side is fringed by a reef which dries; a bank, with depths of less than 3 fathoms, ( $5^m5$ ) over it, extends about 7 cables northward and 3 cables westward of this reef.

Nosy Ovy, the largest island of the group, lies about  $1\frac{1}{2}$  miles south-eastward of Nosy Kalakajoro, with a shallow bank extending about 6 cables northward of its northern extremity; a ridge of wooded hills extends the length of the island, increasing in elevation towards the southern end, where it attains an elevation of 505 feet ( $153^m9$ ). The eastern side of this island is almost steep-to, but the western side is 35 fringed by a reef which dries, with a shallow bank extending as much as 7 cables offshore; from the south-eastern extremity of the island a narrow shingle spit, which dries about 13 feet ( $4^m0$ ), extends about  $1\frac{1}{2}$  miles east-south-eastward and is continued by a line of barely sunken rocks for about one mile further in the same direction to within 40 about three-quarters of a mile of the coastal reef.

The channel between Nosy Kalakajoro and Nosy Ovy is free from dangers; a vessel using this channel should keep on its north-western side.

Antany Mora, 472 feet ( $143^m9$ ) high, lying about 4 miles south-south-westward of the south-western point of Nosy Ovy, is fringed by a reef which dries, and which extends about one mile northward and 8 cables east-south-eastward of it; a detached patch, which dries, lies about 7 cables east-north-eastward of its north-eastern point. 45

There is a navigable channel, about  $2\frac{1}{2}$  miles wide, between Nosy 50 Ovy (*Lat.*  $14^{\circ} 03' S.$ , *Long.*  $47^{\circ} 50' E.$ ) and Antany Mora; a vessel using this channel should keep nearer Nosy Ovy, on account of the detached shoals northward and north-westward of Antany Mora.

*Charts 758, 2762, 597.*

*Chart 705.*

Nosy Valiha, 564 feet (171<sup>m</sup>9) high, lying about 2½ miles south-eastward of the eastern extremity of Antany Mora, is hilly, and is fringed on its northern and western sides by a reef which dries, and which extends as much as 4 cables offshore. A village stands on the western side of the island, about one mile from its northern extremity.

There is a navigable channel, about 1½ miles wide, between Antany Mora and Nosy Valiha; a vessel should keep near the centre of the channel.

- 10 **Off-lying shoals.**—There are many dangerous shoals lying on the outer reef westward and south-westward of Iles Radama; the positions of these can best be seen on the chart.

A rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, the position of which is doubtful, was reported, in 1922, to lie about 6½ miles west-  
15 south-westward of Antany Mora.

**Caution.**—As the bottom in the neighbourhood of the Radama group is very irregular, a very small error in position is enough to give very different depths from those charted; the banks have not been, as yet, sufficiently examined, and other dangers may remain  
20 undiscovered; and as the islands and mainland are frequently hidden by fog or during rain squalls the utmost caution should be exercised in approaching them. The water over the outer reef is very clear, but it is very uncertain if the inner reef can be seen, especially during the rainy season, when the water is discoloured by the discharge from  
25 the rivers, *see* also Caution on page 163. Mariners are recommended to keep to seaward of the outer reefs.

**Anchorage.**—Shelter from sea breezes may be obtained by anchoring off the eastern side of Nosy Ovy, in depths of from 4½ to 9 fathoms (8<sup>m</sup>7 to 16<sup>m</sup>5), good holding ground.

- 30 **COAST.**—Between Pointe Sangajira and Pointe Analalava, about 20 miles south-south-westward, the coast is deeply indented forming Baie de Rafaralahy, Baie de Sahamalaza or Port Radama, and Baie Ramanetaka.

**Baie de Rafaralahy.**—Baie de Rafaralahy is entered between  
35 Pointe Sangajira and Pointe Lavalohalika, about 6½ miles south-south-eastward; the outer part of the bay is fringed on each side by coral reefs extending as far as 1½ miles offshore, and the head of the bay is foul and shallow.

Fort de Sada, with a flagstaff, stands on a hill, 417 feet (127<sup>m</sup>1) high,  
40 about 2 miles eastward of Pointe Sangajira; the village of Tanandava is situated on the crest of this hill westward of the fort; Anoront-sangana, a large village, with a Custom house marked by a flagstaff, is situated on the coast about 2 miles east-south-eastward of Pointe Sangajira.

45 Pointe Lavalohalika (*Lat. 14° 50' S., Long. 47° 57' E.*) can be identified by two hills, one, 180 feet (54<sup>m</sup>9) high, near its extremity, and another, 275 feet (83<sup>m</sup>8) high, about 1½ miles east-south-eastward of the first hill; coral reefs and sandbanks, which dry in parts, extend about 3½ miles west-north-westward of Pointe Lavalohalika, with a  
50 boat channel through them, which is often used by native boats.

The shores of the bay are so covered with mangroves that it is only possible to land at the town, and on the southern side of the bay close within the southern entrance point. At low water it is

*Charts 758, 2762, 597.*

*Chart 705.*

difficult to land abreast the town in large boats; it is then best to proceed higher up the bay and enter a channel which leads to the back of the town. Boats of light draught can land at all times close westward of the Custom house. 5

**Tides.**—High and low water succeed one another at fairly regular intervals, but the height of consecutive tides varies greatly, as large a difference as 7 feet (2<sup>m</sup>1) having been noted.

**Dangers.**—Banc du Vaudreuil, fronting the entrance to Baie de Rafaralahy, lies with its northern extremity about 4 miles west-south-westward of Pointe Sangajira, and extends about 3 miles south-south-eastward; it consists of several shoals and rocks, some of which dry. 10

A detached shoal, with a depth of 2½ fathoms (4<sup>m</sup>1) over it, lies about 2½ miles north-westward of Pointe Lavalohalika, and a rock, with a depth of less than 6 feet (1<sup>m</sup>8), about one mile northward of the same point. 15

Patches of reef, which dry, lie about 2 miles north-north-eastward of Pointe Lavalohalika.

**Directions.**—**Anchorage.**—A vessel coming from northward should steer to pass about 2 miles westward of Pointe Sangajira, and then steer south-eastward about midway between Banc du Vaudreuil and the coastal reef, until Fort de Sada flagstaff bears about 015°, when course may be shaped for the desired anchorage. 20

The *Flying Fish* anchored, in 1887, off Anorontsangana, in depths of 9 fathoms (16<sup>m</sup>5), with Pointe Lavalohalika bearing 170° and the southern extremity of Nosy Kalakajoro 264°, apparently very close to the edge of the coastal reef, but found the anchorage good, and that the sea breeze blew more during the hottest part of the day, rendering the temperature more agreeable than at other places on this coast. 25

There are two gaps in the coastal reef fronting Anorontsangana in which small vessels with local knowledge can obtain sheltered anchorage. 30

Beef and poultry are obtainable.

**Caution.**—In this bay the colour of the water does not give any indication of approach to the reefs. Vessels arriving in the morning, with the sun ahead, find it difficult to estimate the distance they are from the coast. The position of the native boats off the town, seen over the reefs, is very deceptive to a stranger. 35

**Baie de Sahamalaza.**—Baie de Sahamalaza is entered between Pointe Lavalohalika (*Lat.* 14° 00' S., *Long.* 47° 57' E.) and Pointe Berangomaina, about 5½ miles south-south-westward, and affords good anchorage; Rivière Berondra and Rivière Manonganio (Manongarivo river) flow into the northern and southern sides, respectively, of the head of the bay. 40

Pointe Berangomaina can be identified by an isolated hill, 200 feet (61<sup>m</sup>0) high, about half a mile eastward of its extremity; a reef, which dries, fringes this promontory, extending about one mile north-westward and 1½ miles northward and north-eastward of it. 45

There is a navigable channel, about half a mile wide, between the reef extending north-westward from Pointe Berangomaina and the line of sunken rocks extending east-south-eastward from the south-eastern extremity of Nosy Ovy. 50

The eastern side of the bay, especially its southern part, is low and fringed with a dense screen of mangroves; the western side is generally steep and rocky, with some mangroves on its southern part.



*Chart 705.*

Pointe Amboliboso, about 8 miles east-south-eastward of Pointe Berangomaina, is rocky, and rises to a conical bluff, 236 feet (71<sup>m</sup>9) high, fringed with mangroves; it forms the western entrance point of  
 5 Rivière Manonganio.

The village of Ankatafa is situated on the north-eastern side of the bay, about 3½ miles south-eastward of Pointe Lavalohalika.

**Aspect.**—Berahodo or Sommet Porte, about 10½ miles east-north-eastward of Pointe Lavalohalika, is mentioned on page 187; Anto-  
 10 anina, about 2½ miles south-south-westward of Berahodo, is a saddle-shaped mountain, with two peaks, the northern 1,637 feet (499<sup>m</sup>6) and the southern 1,663 feet (505<sup>m</sup>9) high; Ankaramy, about 6 miles southward of Antoanina, is a bare mountain, 1,335 feet (406<sup>m</sup>9) high. Mont Marotaolana, with a flattened isolated summit, 2,139 feet (652<sup>m</sup>0)  
 15 high, about 10½ miles south-south-eastward of Ankaramy, is also devoid of vegetation; there are some dark coloured belts, almost horizontal, on the seaward side of this mountain. Ampombiabo, 1,217 feet (370<sup>m</sup>9) high, about 13½ miles southward of Pointe Berangomaina, whose elongated crest is nearly level, has a conspicuous group  
 20 of trees on its summit.

**Tidal streams.**—The tidal streams in the entrance rarely exceed a rate of 2 knots at springs; they are stronger in the south-eastern part of the bay, where, during the ebb stream, the water is fresh.

**Winds.**—The Talio or north-westerly sea breeze loses itself in the  
 25 narrow part of Baie de Sahamalaza, where it blows from northward from 1000 to 1700; it sometimes blows fresh.

The Varatrano or south-easterly land breeze blows lightly during the night.

The wind never raises a troublesome sea in this bay.

30 **Islet and dangers.**—Within about 5 miles westward of Pointe Lavalohalika a chain of reefs and shoals extends about 10½ miles east-south-eastward into Baie de Sahamalaza; the positions of these dangers can best be seen on the chart.

Ile Verte, about 5 miles south-eastward of Pointe Lavalohalika and  
 35 three-quarters of a mile offshore, lies at the south-eastern end of a reef which dries; it is flat and wooded, with a conspicuous group of trees at its centre.

A shoal, with a depth of half a fathom (0<sup>m</sup>9) over it, lies near the southern end of a bank, with depths of from 4 to 4½ fathoms (7<sup>m</sup>3 to 8<sup>m</sup>2), in the northern approach to Rivière Manonganio (*Lat. 14° 08' S., Long. 48° 02' E.*); a 5-fathom (9<sup>m</sup>1) patch lies about 3½ cables eastward of the northern end of this bank.

**Directions.**—This bay has only been partially examined, and vessels approaching it should not deviate from the recommended tracks.

45 A vessel approaching Baie de Sahamalaza should pass about 7 cables off the eastern coasts of Nosy Kalakajoro and Nosy Ovy, and, when about 2½ miles northward of the southern extremity of Nosy Ovy, should bring the 200-foot (61<sup>m</sup>0) summit on Pointe Berangomaina to bear 137°, and steer for it on that bearing until Ile Verte is in line  
 50 with the southern fall of Ankaramy, bearing 095°, which should be steered for, until the 200-foot (61<sup>m</sup>0) summit mentioned above bears 180°, and the 180-foot (54<sup>m</sup>9) summit on Pointe Lavalohalika is in line with Les Deux Sœurs (page 179), bearing 031°.

A vessel proceeding farther up the bay should then steer east-south-

*Charts 758, 2762, 597.*

**Chart 705.**

eastward through the fairway until the summit of Pointe Amboliboso bears  $197^{\circ}$ , when course should be altered south-south-eastward steering for a conspicuous red spot on the eastern fall of Sommet Plateau, a table-topped hill, 993 feet ( $302^m7$ ) high, about  $7\frac{1}{4}$  miles south-south-eastward of Pointe Amboliboso, bearing about  $162^{\circ}$ . In order to avoid the shoal, with a depth of half a fathom ( $0^m9$ ), lying about  $1\frac{1}{4}$  miles northward of Pointe Amboliboso, this point should not be brought to bear less than  $210^{\circ}$ . 5

**Anchorage.**—Vessels can obtain anchorage, according to their size 10 and draught, in Baie de Sahamalaza, but caution is necessary as there may be other dangers than those charted.

Vessels can anchor on the south-western side of the bay, a little within its entrance, in depths of from 8 to 9 fathoms ( $14^m6$  to  $16^m5$ ), with the 200-foot ( $61^m0$ ) summit of Pointe Berangomaina, bearing  $15259^{\circ}$ , distant 2 miles. 15

A vessel can obtain anchorage near the head of the bay, in depths of about 10 fathoms ( $18^m3$ ), with Ankarany bearing  $063^{\circ}$  and the conical summit of Pointe Amboliboso  $185^{\circ}$ .

Landlocked anchorage can be obtained in the vicinity of Pointe 20 Amboliboso, in depths of from 8 to 12 fathoms ( $14^m6$  to  $21^m9$ ), but the channel should be marked.

**Baie Ramanetaka.**—Baie Ramanetaka is entered between Pointe Berangomaina and Pointe Analalava, about 9 miles south-westward. This bay, though large, is encumbered with reefs and shoals, and has 25 not been thoroughly examined, so should not be used.

A vessel making Baie Ramanetaka can pass on either side of Nosy Valiha, but the eastern channel, though wider, is more encumbered with dangers.

**Coast.—Dangers.**—Between Pointe Analalava and Pointe Andra- 30 nomena, about  $2\frac{1}{4}$  miles south-westward, the coast is indented and fringed by a reef, which appears to be steep-to.

Between Pointe Andranomena (*Lat.  $14^{\circ} 15' S.$ , Long.  $47^{\circ} 47' E.$* ) and Pointe Antsatsiaka (Antsatsaka point), about  $6\frac{1}{4}$  miles south-south-westward, the coastal reef, on the edge of which stand some 35 rocks which dry, extends about one mile offshore, in places. There are numerous gaps in this part of the coastal reef, which has led to the establishment of villages on the coast; the principal gap, known as Baie Andranobé, is situated about 2 miles southward of Pointe Andranomena. 40

The coastal bank extends as far as 15 miles offshore, and on its edge will be found shoals, with depths of  $3\frac{1}{4}$  fathoms ( $6^m9$ ), or perhaps less; a second line of shoals fronts the coast at a distance of about 4 miles offshore, with depths of  $2\frac{1}{4}$  fathoms ( $5^m0$ ), or perhaps less. The positions of these dangers can best be seen on the chart. 45

**Chart 704.**

**ANALALAVA AND APPROACHES.—Coast.—Aspect.**—From Pointe Antsatsiaka the coast trends about 4 miles south-south-westward to Pointe Ankirakanga and thence about  $12\frac{1}{4}$  miles southward to the entrance to Rivière Loza; it is fringed for the first 9 miles of its 50 length by a coral reef, and by a sandbank for the remaining stretch of this part of the coast.

Southward of Pointe Antsatsiaka the coast is backed by a gentle

*Chart 704.*

wooded slope which rises to Sommet Antsatramahavelona, 1,084 feet (330<sup>m</sup>4) high, situated about 8½ miles south-eastward of Pointe Ankirakanga.

5 *Chart 705.*

**Off-lying islands and dangers.—Light.**—Nosy Saba (Nosi Shaba), or Beroja, lies about 4 miles westward of Pointe Antsatsiaka; its south-western and higher end, 138 feet (42<sup>m</sup>1) high, is covered with trees. The northern and western sides of this island are fringed by  
10 a coral reef, which extends about 6 cables westward of it; the eastern and southern sides are almost steep-to. From westward Nosy Saba is difficult to distinguish against the mainland.

*Chart 704.*

Lyra bank, lying about 4½ miles south-south-westward of Nosy Saba,  
15 has a least depth of 2½ fathoms (4<sup>m</sup>6), coral, over it; a 3-fathom (5<sup>m</sup>5) coral patch lies about 9 miles westward of Lyra bank.

A shoal, with a depth of 4½ fathoms (8<sup>m</sup>7), coral, over it, lies about 17½ miles west-south-westward of Nosy Saba, and a similar shoal about 22 miles south-westward of the same island; these shoals lie  
20 near the western edge of the outer reef.

Nosy Lava, lying about 8½ miles south-south-westward of Nosy Saba, is hilly, with a small conical peak, 341 feet (103<sup>m</sup>9) high, near the centre of the island, which is easily identified; some white cliffs and a peak at the northern end of the island form a good landmark for  
25 a vessel coming from westward. The western side of this island presents a series of white cliffs and sandy beaches, which show up very clearly in the afternoon with the sun shining on them; the eastern side is high and consists of crumbling cliffs rising steeply from the coast.

30 The island is but little cultivated, but there are numerous coconut and mango trees.

*Chart 708, plan of Nosi Lava anchorage.*

Salara (*Lat.* 14° 33' S., *Long.* 47° 37' E.), the principal village, situated about the middle of the eastern side of Nosy Lava, stands on  
35 a strip of sand separated from the coast by a mangrove swamp, which dries, but forms a lagoon at high water; it is situated at the foot of a cultivated valley descending from the summit of the island. Near the centre of a hill, behind the village, is a long white mark visible from a distance of about 10 miles. There is a flagstaff at the south-  
40 eastern extremity of the village.

Eggs and poultry may be obtained at Salara, and at other villages in the island.

A light is exhibited at an elevation of 400 feet (121<sup>m</sup>9) from a black and white metal tower, 49 feet (14<sup>m</sup>9) in height, situated on the summit  
45 of Nosy Lava.

*Chart 704.*

A reef fringes the western and southern sides of Nosy Lava, extending about 9 cables north-north-westward of its northern extremity and about one mile south-westward of the south-western extremity of  
50 the island.

Rochers de la Pointe Sud-Ouest (South-West rocks), two rocks, one drying 3 feet (0<sup>m</sup>9) and the other 5 feet (1<sup>m</sup>5), lie about 1½ miles south-westward of the south-western extremity of Nosy Lava; the summit of Nosy Soy, 244 feet (74<sup>m</sup>4) high, about 3½ miles south-south-eastward

*Charts 704, 758, 2762, 597.*

*Chart 704.*

of the south-western extremity of Nosy Lava, in line with Tombée Marotaolana, 841 feet (256<sup>m</sup>3) high, about 10½ miles east-south-eastward of Nosy Soy, bearing 123°, leads about half a mile south-south-westward of these rocks.

Nosy Toloho, a rocky islet, 36 feet (11<sup>m</sup>0) high, covered with scanty vegetation, lies at the edge of the reef extending southward of Nosy Lava, about 2 miles eastward of Rochers de la Pointe Sud-Ouest; a shallow bank extends about half a mile south-south-westward of Nosy Toloho.

Nosy Soy, lying about 2½ miles southward of Nosy Toloho, is an inaccessible bluff-sided islet, covered with trees; when seen from north-westward it appears like a saddle with the pommel pointing north-eastward. Nosy Soy is fringed by a reef, which extends one cable westward of it; a rock, which dries 4 feet (1<sup>m</sup>2), lies at the western edge of this reef; a bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, extends as far as 5 cables from this islet.

*Charts 708, plan of Nosi Lava anchorage; 704.*

**Anchorage.—Directions.—Dangers.**—The whole space between Nosy Lava and the mainland eastward may be considered as a large roadstead affording anchorage, with generally a sandy or muddy bottom, and good holding ground.

The anchorage off Salara, much frequented by coasters, is accessible to large vessels, and is sheltered from westerly winds by the island, and from south-easterly seas by the reefs surrounding Nosy Lango, an islet, 50 feet (15<sup>m</sup>2) high, lying about 3½ miles east-south-eastward of the south-eastern side of Nosy Lava.

A vessel bound for the anchorage off Salara (*Lat.* 14° 33' S., *Long.* 47° 37' E.) can pass northward of Nosy Lava, rounding its northern extremity at a distance of about 2 miles; when Nosy Lava light-tower bears 211° a vessel can steer for it on that bearing in order to make the anchorage.

If passing southward of Nosy Lava a vessel should bring the summit of Nosy Soy in line with Tombée Marotaolana, bearing 123°, which leads through the passage in the outer reef (page 186), called Passe de Narendry, passing south-south-westward of Rochers de la Pointe Sud-Ouest. The northern extremity of Nosy Lango should then be steered for, bearing 077°, until Nosy Soy bears 213°, whence a vessel should steer with that islet, astern, on this latter bearing, until the south-eastern end of Nosy Lava has been rounded; a vessel can keep fairly close to this part of Nosy Lava as it is nearly steep-to. Thence a vessel must bear northward, keeping Nosy Soy open its own breadth eastward of the south-eastern point of Nosy Lava, which leads through Chenal de Nosy Lava, passing north-westward and westward of Banc Ouest de Lango (West Lango bank) and Banc Nord-Ouest de Lango (North-West Lango bank), and about midway between a shoal, with a least depth of 4½ fathoms (7<sup>m</sup>8) over it, lying about 6½ cables east-north-eastward of the south-eastern point of Nosy Lava, and a 2½-fathom (5<sup>m</sup>0) patch about 8 cables north-north-eastward of the same point; this latter shoal is steep-to, and is marked by heavy swirls; Nosy Soy kept open south-eastward of the south-eastern point of Nosy Lava leads south-eastward of this latter patch.

Banc Ouest de Lango, consisting of sand and coral, with depths of less than 6 feet (1<sup>m</sup>8) over it, extends about 2½ miles westward of

*Charts 758, 2762, 597.*

*Charts 708, plan of Nosi Lava anchorage; 704.*

Nosy Lango; Banc Nord-Ouest de Lango, lying about  $1\frac{1}{2}$  miles north-westward of Nosy Lango, has a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ).

When the north-eastern point of Nosy Lava bears  $310^\circ$  a vessel can steer for it on this bearing, until the light-tower bears  $211^\circ$ , when the anchorage can be steered for.

*Chart 708, plan of Nosi Lava anchorage.*

The best berth is with Nosy Lava lighthouse just seen north-westward of a corrugated iron house, bearing  $210^\circ$ , and the eastern extremity of the island bearing  $121^\circ$ . This anchorage is in the centre of a circle, with a radius of about a cable, outside the 5-fathom ( $9^m1$ ) line, and well sheltered from choppy seas; the 3-fathom ( $5^m5$ ) line is within about  $1\frac{1}{2}$  cables of the anchorage.

A detached shoal, with a depth of  $4\frac{1}{2}$  fathoms ( $8^m2$ ) over it, lies about 3 cables north-north-eastward of the south-eastern entrance point of the anchorage off Salara.

*Chart 704.*

**Analalava.—Aspect.—Beacons.**—The small town of Analalava is situated on the south-eastern side of the entrance to Rivière Loza.

The coast northward of the entrance, as far as Pointe Ankorobé, a distance of about 3 miles, rises rapidly, and is covered with vegetation; southward of the entrance, as far as Pointe Antsamanara, about  $7\frac{1}{2}$  miles southward of Pointe Ankorobé (*Lat.  $14^\circ 34'$  S., Long.  $47^\circ 43'$  E.*), the land rises more gently, and is also covered with vegetation.

There are two black and white pyramidal masonry beacons, the front one 19 feet ( $5^m8$ ) in height, situated on the coast about  $2\frac{1}{2}$  miles south-south-eastward of Pointe Ankorobé and close south-eastward of the village of Andronjana Sud, and the rear beacon, 26 feet ( $7^m9$ ) in height, about  $1\frac{1}{2}$  miles east-north-eastward of the front beacon.

Ballon Loza, 739 feet ( $225^m2$ ) high, on the summit of which is a pole, surmounted by a pyramid, about 9 miles southward of Sommet Antsahavelona, is very conspicuous; Faux Ballon (False Loza peak), 454 feet ( $138^m4$ ) high, about  $2\frac{1}{2}$  miles south-westward of Ballon Loza, is also conspicuous; Tombée Marotaolana, about  $4\frac{1}{2}$  miles south-south-westward of Faux Ballon, is the northern extremity of a wooded ridge extending about 22 miles south-south-westward, parallel to the coast.

A plateau, 155 feet ( $47^m2$ ) high, its lower part surrounded by mango groves, is situated close to the coast, about  $2\frac{1}{2}$  miles south-south-westward of Analalava; a beacon stands at the northern end of this plateau, and a white pyramidal masonry beacon, 19 feet ( $5^m8$ ) in height, is situated about  $2\frac{1}{2}$  miles east-south-eastward of it.

**Light.**—A light is exhibited at an elevation of 203 feet ( $61^m9$ ) from a black and white metal tower, 33 feet ( $10^m1$ ) in height, situated at Analalava.

**Islets and dangers in entrance.—Beacons.—Buoy.**—Nosy Lango, 50 feet ( $15^m2$ ) high, about  $4\frac{1}{2}$  miles west-north-westward of Analalava, is sandy and densely wooded; it lies near the eastern edge of a coral reef, above water and sunken, which extends about  $1\frac{1}{2}$  miles north-north-westward and southward of it; Banc Est de Lango (East Lango bank), with a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) over it, extends about one mile eastward of the southern part of this reef. The southern extremity of the reef is marked by a pole, surmounted by a cylinder,

*Charts 704, 758, 2762, 597.*

*Chart 704.*

painted black, and is covered by the *green* sector of Analalava light, between the bearings of  $095^{\circ}$  and  $100^{\circ}$ .

Banc Ouest de Lango, extending westward of Nosy Lango, is described on pages 195-196; La Queue de Lango (Lango Tail) is the south-western extension of Banc Ouest de Lango and, about  $2\frac{1}{2}$  miles south-westward of Nosy Lango, has a detached coral head, with a depth of 3 fathoms ( $5^m5$ ) over it, at its south-western extremity, which is covered by a *red* sector of Analalava light, between the bearings of  $087^{\circ}$  and  $092^{\circ}$ .

Nosy Faohina, about  $2\frac{1}{2}$  miles southward of Nosy Lango, is low, sandy, and thickly wooded; a conspicuous group of trees, the tops of which are about 67 feet ( $20^m4$ ) high, stands at the centre of this islet. Nosy Faohina lies at the north-eastern edge of a coral reef, above water and sunken, which extends about one mile westward and south-westward of it; a bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, extends about three-quarters of a mile farther westward; the northern end of this reef is covered by the *red* sector of Analalava light (*Lat.  $14^{\circ} 38' S.$ , Long.  $47^{\circ} 46' E.$* ) described above, and is marked at its northern extremity by a spar, surmounted by a black cone.

Banc de la Passe (Channel bank), with a least depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) over it, lies in mid-channel in Passe du Milieu (Middle pass), the channel between the reefs on which lie Nosy Lango and Nosy Faohina.

A detached shoal, with a least depth of  $1\frac{1}{2}$  fathoms ( $3^m2$ ) over it, lies close east-south-eastward of Nosy Faohina, and extends about one mile south-south-westward.

Banc de la Table, some patches of which dry 4 feet ( $1^m2$ ), lies about  $2\frac{1}{2}$  miles west-south-westward of Analalava light-tower and about three-quarters of a mile offshore.

The bank which borders the north-western entrance point of Rivière Loza was reported, in 1912, to be extending seaward; this point should be given a berth of one mile.

The coastal bank bordering the south-eastern side of the entrance to the river extends as far as 2 cables offshore; it is steep-to, and is marked at its western edge, westward of Analalava light-tower, by a red conical buoy.

**Channels.—Directions.—Dangers.—Passe du Nord.**—Passe du Nord (North pass), between the mainland and Nosy Lava, leads from northward to the entrance to Rivière Loza.

A vessel coming from northward should, having passed Nosy Saba, steer with the 138-foot ( $42^m1$ ) summit at the south-western end of that island, astern, bearing  $345^{\circ}$ , until the western extremity of Nosy Faohina, bearing  $188^{\circ}$ , is just open eastward of Nosy Lango, when it should be steered for on that bearing, which leads between a 4-fathom ( $7^m3$ ) and a  $4\frac{1}{2}$ -fathom ( $8^m2$ ) coral patch, lying about  $2\frac{1}{2}$  miles, respectively, northward and north-north-eastward of Nosy Lango, to within about  $1\frac{1}{2}$  miles of the latter islet.

The 155-foot ( $47^m2$ ) high plateau,  $2\frac{1}{2}$  miles south-south-westward of Analalava, can be easily identified, and the beacon at its northern end brought to bear  $155^{\circ}$  and steered for on that bearing, which leads through the fairway to off the entrance to Rivière Loza, from whence course may be shaped for the desired anchorage.

There is a least depth of  $5\frac{1}{2}$  fathoms ( $9^m6$ ) in the channel described above.

*Charts 758, 2762, 597.*

*Chart 704.*

*Passe du Milieu.*—Passe du Milieu is the principal and only marked channel of approach to Analalava, but the leading marks must be strictly adhered to on account of the strong tidal streams in the narrow  
 5 part of the channel; there is a least depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ) in the fairway.

A vessel coming from westward should pass about 3 cables southward of Nosy Soy, and bring the highest trees on Nosy Faohina in line with Ballon Loza, bearing about  $088^\circ$ , and steer on that transit until Sommet  
 10 Antsatramahavelona bears  $047^\circ$ , just open south-eastward of Nosy Lango, when a vessel will be south-eastward of La Queue de Lango.

A vessel should now bring the beacons in the vicinity of Andronjana Sud (*Lat.  $14^\circ 36' S.$ , Long.  $47^\circ 44' E.$* ) in line, bearing  $068^\circ$ , which leads about midway between the beacons marking the southern and northern  
 15 ends, respectively, of the reefs extending southward and northward of Nosy Lango and Nosy Faohina.

If taking the northern side of the channel a vessel should bring Analalava light-tower in line with Ballon Loza, bearing  $096^\circ$ , which leads over the north-western edge of Banc de la Passe in a least depth  
 20 of 5 fathoms ( $9^m1$ ); it is essential not to deviate from the line of the leading marks. As in this vicinity there are depths of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) and the tidal streams are strong a vessel, drawing more than 23 feet ( $7^m0$ ), should make sure that the state of the tide allows of her taking this route.

Alternatively, a vessel can continue steering  $068^\circ$ , as described above, until the beacon at the southern end of the reef extending southward of Nosy Lango is in line with the 221-foot ( $67^m4$ ) conical hill at the south-western end of Nosy Lava, bearing  $296^\circ$ , thus avoiding the most intricate part of the channel. A vessel should then steer  
 30 east-south-eastward with this transit, astern, which leads southward of Banc Est de Lango; when the south-eastern extremity of Nosy Faohina bears  $230^\circ$  Analalava light-tower should be brought in line with Ballon Loza, bearing  $095^\circ$ , and course shaped for the desired anchorage.

A vessel can pass south-westward of Banc de la Passe by bringing the beacon marking the northern end of the 155-foot ( $47^m2$ ) plateau,  $2\frac{1}{2}$  miles south-south-westward of Analalava, in line with the white pyramidal masonry beacon,  $2\frac{1}{2}$  miles east-south-eastward of it, bearing  $120^\circ$ . A vessel will be clear of this bank when the south-eastern  
 40 extremity of Nosy Faohina bears  $225^\circ$ , whence the doctor's house, a white house with a red roof, surrounded by a verandah, situated on a plateau at the northern end of the town, should be steered for bearing  $082^\circ$ , until Analalava light-tower is in line with Ballon Loza, bearing  $095^\circ$ , and course then shaped for the desired anchorage; the doctor's  
 45 house is said to be hidden by trees.

At night a vessel should keep in the *white* sector of Analalava light, between the bearings of  $092^\circ$  and  $095^\circ$ , which leads through Passe du Milieu over Banc de la Passe in a least depth of 23 feet ( $7^m0$ ).

*Passe du Sud.*—Passe du Sud (South pass), between the mainland  
 50 and Nosy Faohina, is about half a mile wide with a least depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ); the tidal streams here are not so strong as in Passe du Milieu.

The southern extremity of the 155-foot ( $47^m2$ ) plateau,  $2\frac{1}{2}$  miles south-south-westward of Analalava, in line with Faux Ballon, bearing

*Chart 704.*

090°, leads from southward of Nosy Soy up to Passe du Sud, until Nosy Faohina is in line with Nosy Lango, bearing 002°, when course can be altered north-eastward through the channel towards the desired anchorage.

**Jetty.—Lights.**—A stone jetty, alongside which small vessels can lie at high water only, extends from the shore abreast the town (*Lat. 14° 37' S., Long. 47° 46' E.*) to the edge of the coastal reef.

A light is exhibited at an elevation of 26 feet (7<sup>m</sup>9) from a metallic framework, 10 feet (3<sup>m</sup>0) in height, situated at the head of this jetty.

A light is exhibited at an elevation of 62 feet (18<sup>m</sup>9) from a white column on a masonry base, 23 feet (7<sup>m</sup>0) in height, situated on a hillock in the village of Ampasikély, on the south-eastern side of the entrance to Rivière Loza, about 4 cables north-eastward of the light on the head of the jetty.

**Anchorage.—Currents.—Beacons.**—The anchorages off Analalava lie between the deep gully in the entrance to Rivière Loza, and the almost vertical edge to the bank which forms the low water mark off the town. In the vicinity of the deep gully the bottom is sand, and the eddies cause vessels anchored there to swing continually. There is a counter current in the gully, which becomes more pronounced the farther southward a vessel is situated in it.

Two beacons, which, when in line, bear 047°, mark the anchorage off Analalava; the front beacon, which consists of a pole, 13 feet (4<sup>m</sup>0) in height, is surmounted by a rectangle, painted black and white, stands on the south-eastern bank of Rivière Loza, in front of the village of Ampasikély, about 9 cables northward of Analalava light-tower; the rear beacon, a pole, 20 feet (6<sup>m</sup>1) in height, surmounted by a rectangle painted black and white, stands on the north-western bank of the river. These beacons are hard to identify, especially in the early morning, the rear one only being discernible when a vessel arrives at the anchorage.

Anchorage can be obtained with the anchorage beacons in line, bearing 047°, and Analalava light-tower in line with Ballon Loza, bearing 095°. This anchorage is inconvenient, on account of the distance offshore, and the strong currents.

A better anchorage is further north-eastward, with the anchorage beacons in line, bearing 047°, and a vessel riding head to stream.

The Messageries Maritimes vessels anchor in depths of from 12 to 14 fathoms (21<sup>m</sup>9 to 25<sup>m</sup>6), with the anchorage beacons in line, bearing 047°, and the Company's office in line with the second group of trees southward of the Residency. In this position a vessel is about 2½ cables from the coastal bank and about one cable from the 5-fathom (9<sup>m</sup>1) line.

Smaller vessels can anchor in depths of 10 fathoms (18<sup>m</sup>3), sand, with the anchorage beacons in line, bearing 047°, and Analalava light-tower bearing 129°; if a vessel's draught permits she should anchor closer to the jetty, although the eddies, as stated above, will cause her to swing continually.

**Port limits.**—The limits of the port are as follows:—

From a position on the high water line close north-westward of the anchorage front leading beacon at Ampasikély (*Lat. 14° 37' S., Long. 47° 46' E.*), a line drawn in a 315° direction for a distance of 3½ cables, thence in a 270° direction for 16 cables, thence in a 180° direction for

*Charts 758, 2762, 597.*



*Chart 704.*

a distance of  $19\frac{1}{2}$  cables, thence in an  $090^\circ$  direction for about  $2\frac{1}{2}$  cables, and thence in an  $056^\circ$  direction to the high water line on the northern bank of a river, in a position  $236^\circ$ , distant about half a mile, from  
 5 Analalava light-tower.

**Town.—Landmarks.**—Analalava is the chief town of the province.

There are two conspicuous buildings, viz., the Residency, a one-storied house with a verandah, standing on the summit of a hill, about a quarter of a mile north-westward of Analalava light-tower, and the  
 10 Messageries Maritimes Company's office, standing on the coast, north-westward of the Residency; the latter is a square house, with a sloping iron roof on which is painted a large black band. The Custom house is situated near the jetty.

**Communications.**—There is regular steamer communication with  
 15 other Madagascan ports.

There is also periodical steamer communication with Marseilles.

Analalava is connected with the general telegraph system.

**Port facilities.**—Fresh provisions can be obtained.

A schooner is always available for unloading.

20 There is a native hospital.

**Signal station.—Storm signals.**—There is a signal station, with which vessels can communicate by day.

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed at Analalava.

25 **Rivière Loza.**—The entrance to Rivière Loza presents no difficulties, and a vessel should proceed in mid-channel. The coastal bank on the south-eastern side of the entrance is easily distinguished; *see* also page 197. Close eastward of the south-eastern entrance point is a small bay where small vessels with local knowledge can lie alongside  
 30 the steep river bank.

When approaching the projecting point, covered with dense jungle, which lies about  $3\frac{1}{4}$  miles above the entrance, the left bank of the river should be kept aboard and the point rounded closely to avoid the sandbank which encumbers the bight northward of this point. Thence  
 35 a mid-channel course leads to the entrance to a lagoon, called Panantsova, about 9 miles above the entrance to the river; this lagoon has been only cursorily examined, and there are some dangerous shoals. Both the northern and southern shores of the lagoon are low and bordered by mangroves.

40 **Tidal streams.**—The tidal streams off Ampasikély are strong; the ebb stream is stronger than the flood and sets towards the south-eastern shore, with an eddy; the flood stream sets in about mid-stream.

**Baie de Narendry.**—Baie de Narendry, on the southern side of the  
 45 approach to Analalava, is entered between Pointe Maromony, about  $8\frac{1}{4}$  miles south-westward of the south-western extremity of Nosy Lava, and Pointe Antsamanara, about 13 miles eastward, and extends about 30 miles south-south-westward.

Pointe Maromony (*Lat.  $14^\circ 40'$  S., Long.  $47^\circ 28'$  E.*) is of moderate  
 50 elevation, and terminates in a rocky extremity near which are some trees and a small village; on the eastern side of this point are some red cliffs, 26 feet ( $7^m9$ ) high, but the western side of the point is fringed by a sandy beach.

A ridge of steep hills runs parallel to the coast on the western side

*Charts 758, 2762, 597.*

*Chart 704.*

of the bay. Pointe Komatsana, about  $3\frac{1}{2}$  miles south-eastward of Pointe Maromony, can be identified by some white cliffs at its extremity; Ankalafa, a village about  $3\frac{1}{2}$  miles south-south-westward of Pointe Komatsana, hidden by vegetation, can be identified by the native boats lying on the beach. There are some conspicuous white cliffs about 9 miles south-westward of Pointe Vatonomby (Vatanombi point), a promontory about  $3\frac{1}{2}$  miles south-eastward of Ankalafa. 5

Tombée Marotaolana, about  $3\frac{1}{2}$  miles south-eastward of Pointe Antsamanara, is remarked on on page 196. 10

Rivière Atsingo flows into the bay on its south-eastern side about 18 miles south-south-westward of Pointe Antsamanara, and the village of Narendry, the principal village on the south-eastern side of the bay, is situated on the eastern bank of this river, about 2 miles within the entrance. 15

In addition to Narendry there are several other villages on the south-eastern side of the bay.

An extensive bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, extends as much as  $2\frac{1}{2}$  miles from the south-eastern side of the bay and about  $4\frac{1}{2}$  miles from its head. 20

**Anchorage.**—The only anchorage used in Baie de Narendry is off the mouth of Rivière Atsingo, with the western entrance point of that river, bearing between  $085^\circ$  and  $095^\circ$ , distant about 4 miles. 25

*Chart 758.*

**OUTER REEF** (continued from page 186). From about 11 miles north-north-westward of Pointe Maromony the outer reef continues south-westward, from 3 to 15 miles offshore, as far as a position about 15 miles north-north-eastward of the entrance to Baie de Baly, a distance of about 145 miles. 25

As soundings on the outer reef have only been taken with the object of discovering the best passage through, shoals may exist, as stated on page 186, which are not shown on the chart; consequently, whatever a vessel's draught, it is always best to cross the outer reef by one of the passages recommended, as they have been examined with some exactness. 30 35

South-westward of Baie de Mahajamba, which lies about 40 miles south-westward of Pointe Maromony, the least known depth over the outer reef is 2 fathoms ( $3^m7$ ). On Banc de la Thétis, about 78 miles west-south-westward of the south-western entrance point (*Lat.*  $15^\circ 12' S.$ , *Long.*  $46^\circ 58' E.$ ) of Baie de Mahajamba, the coral appears to be still living, and the bottom very irregular; elsewhere the bottom is regular, the coral being dead and almost always covered with sand or seaweed. 40

The description of the outer reef is continued on page 219.

**Current.**—A constant south-westerly current sets along the side of the outer reef at a rate of from one to  $1\frac{1}{2}$  knots. A similar current is experienced between the outer reef and the coast though, at the same time, the ebb and flood tidal streams may be felt strongly within the bays. 45

**Anchorage.**—Off any part of the coast from Pointe Maromony to Cap Saint-André there is good anchorage, generally, between the outer reef and the coast, the bottom being soft adhesive mud and the depths fairly regular and not too great. 50

*Charts 758, 2762, 597, 748a, 748b.*

H\*

*Charts 377, 704.*

**COAST.—Aspect.**—From Pointe Maromony the coast trends about 16 miles south-westward to Pointe de Marolahy, and is fringed by a bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it. The coast  
5 at first presents the appearance of a sandy beach backed by scattered trees; about midway between Pointe Maromony and Pointe de Marolahy the coast rises and consists of large white cliffs. The background is a series of plateaux, from about 200 to 300 feet (61<sup>m</sup>0 to 91<sup>m</sup>4) high, with some vegetation, and separated from one another  
10 by wooded valleys. The ground is often marshy, and landing is difficult on account of the surf.

A parasol tree stands on the summit of a hill, 214 feet (65<sup>m</sup>2) high, near the coast, about 2 miles north-eastward of Pointe de Marolahy.

Pointe de Marolahy is 201 feet (61<sup>m</sup>3) high, and slopes down to  
15 a circular red cliff, which shows up well from southward.

Between Pointe de Marolahy and Pointe de Majambo, about 5½ miles southward, the coast recedes forming Baie de Moramba.

Pointe de Majambo is hilly, and may be identified by two bare islets, one close westward and the other about 3 cables south-westward  
20 of it; about 3 miles south-westward of Pointe de Majambo is a black promontory, fringed by rocks, on which stand some trees.

From Pointe de Majambo the coast trends about 12½ miles south-westward to Pointe Ambatomifoko and thence about 5½ miles in a similar direction to Pointe Ambozoména; from the latter point the  
25 coast trends about three-quarters of a mile south-south-westward to Pointe Manakara, the north-eastern entrance point of Baie de Mahajamba.

The aspect of this part of the coast is in strong contrast with that farther northward. It is backed by thickly wooded hills, of which  
30 Sommet Cône, 441 feet (134<sup>m</sup>4) high, about 4 miles south-south-eastward of the black promontory mentioned above, Fausse Table (False Table), 713 feet (217<sup>m</sup>3) high, about 5½ miles southward of Sommet Cône, and Masiaposa or Mont de la Table, 700 feet (213<sup>m</sup>4) high, about 8 miles west-south-westward of Fausse Table, are the most  
35 conspicuous.

*Chart 377.*

Pointe Manakara (*Lat.* 15° 11' S., *Long.* 47° 03' E.) can be identified by a white patch, especially conspicuous when the sun is shining on it, situated about three-quarters of a mile southward of it.

*Chart 704.*

**Coast.—Dangers.**—Shoals, with depths of 2½ and 2¾ fathoms (4<sup>m</sup>1 and 5<sup>m</sup>0), coral, over them, lie about half a mile offshore, 1½ miles westward and 2½ miles west-south-westward, respectively, of Pointe Maromony.

45 A shoal, with a least depth of 3½ fathoms (5<sup>m</sup>9) over it, the north-eastern end of which lies about 7½ miles south-westward of Pointe Maromony, extends about 1½ miles west-south-westward, and a shoal, with a depth of 4½ fathoms (8<sup>m</sup>2), lies about 2½ miles farther west-south-westward; Pointe de Marolahy in line with Sommet Cône,  
50 bearing about 188°, leads westward of this latter shoal.

Pointe de Marolahy is fringed by a reef which dries, and a bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, extends about three-quarters of a mile westward of it; this point should be given a berth of not less than one mile.

*Charts 758, 2762, 597.*

*Chart 704.*

The shores of the outer part of Baie de Moramba are thickly wooded ; about 4 miles within the entrance the bay opens out into a shallow basin, the north-western and northern sides of which are high, rocky, and wooded, while the eastern and southern sides are intersected by 5 muddy rivers, flowing through mangrove swamps, and are fronted by some islets and above-water rocks.

About 2 miles south-eastward of Pointe de Marolahy a bar, with a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) over it, extends across the bay.

About 2 miles within the bar is the narrowest part of the entrance 10 channel, on the northern side of which lies a group of rocky islets, covered with trees, of which Ile du Goulet is the south-easternmost and largest ; a shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m1$ ) over it, lies about  $3\frac{1}{2}$  cables south-westward of Ile du Goulet.

**Anchorage.**—**Directions.**—There is anchorage in the bay outside 15 the bar in depths of from  $6\frac{1}{2}$  to 8 fathoms ( $11^m9$  to  $14^m6$ ), mud, with the southern extremity of Ile du Goulet bearing  $072^\circ$ , or closer in, with better holding ground, in depths of  $4\frac{1}{2}$  fathoms ( $8^m2$ ), being careful not to approach too close to the 3-fathom ( $5^m5$ ) line.

The inner part of the bay affords good shelter for small craft with 20 local knowledge ; vessels drawing 15 feet ( $4^m6$ ) may enter at or near high water and anchor about 2 cables south-eastward of Ile du Goulet in depths of about 5 fathoms ( $9^m1$ ), but they should not attempt this anchorage without previously examining the passage. The southern extremity of Ile du Goulet, bearing  $072^\circ$ , leads across the bar in a least 25 depth of  $16\frac{1}{2}$  feet ( $5^m0$ ).

*Charts 377, 704.*

**Coast.**—**Dangers.**—For a distance of about  $2\frac{1}{2}$  miles north-eastward of Pointe de Majambo the coast is fringed by a reef which extends as far as  $4\frac{1}{2}$  cables offshore ; a detached shoal, with a depth of 30  $2\frac{1}{2}$  fathoms ( $4^m1$ ) over it, lies about  $6\frac{1}{2}$  cables north-north-eastward of Pointe de Majambo (*Lat.  $14^\circ 57'$  S., Long.  $47^\circ 16'$  E.*) and  $2\frac{3}{4}$  cables offshore.

A shoal, with a depth of half a fathom ( $0^m9$ ) over it, the position of which is doubtful, lies about 3 miles west-south-westward of Pointe de 35 Majambo and half a mile from the black promontory mentioned on page 202 ; some sunken rocks fringe this promontory, which should be given a good berth.

*Chart 377.*

Pointe Ambatomifoko is rocky, and a shallow bank extends about 40 one mile north-north-westward of it ; this point should be given a wide berth.

The coast between Pointe Ambatomifoko and Pointe Manakara is fringed by a shallow bank and in places by a coral reef.

*Chart 704.*

**Off-lying dangers.**—**Clearing marks.**—Diamond bank, lying 45 about  $6\frac{1}{2}$  miles westward of Pointe Maromony, consists of several detached heads, with a least depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ), coral ; several  $4\frac{1}{2}$ -fathom ( $7^m8$ ) patches lie on the outer reef within a distance of  $6\frac{1}{2}$  miles westward of Diamond bank. 50

Ballón Loza (page 196), bearing about  $086^\circ$ , open northward of Pointe Maromony, and the latter point in line with Nosy Soy (page 195), bearing about  $074^\circ$ , lead northward and southward, respectively, of Diamond bank.

*Charts 758, 2762, 597.*

*Chart 377.*

A sandbank, with a least depth of  $4\frac{1}{2}$  fathoms ( $8^m2$ ) over it, lies with its southern extremity about  $4\frac{1}{2}$  miles north-north-westward of Pointe Ambatomifoko, and extends about  $1\frac{1}{2}$  miles north-north-eastward.

- 5 A shoal, with a least depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) over it, lies with its northern extremity about  $4\frac{1}{2}$  miles west-north-westward of Pointe Ambatomifoko, and extends about 3 miles southward.

*Charts 704, 758.*

**Directions.—Anchorage.**—The south-east trade blows with great strength through the gorges of Baie de Narendry and Baie de Mahajamba and of the hills separating them. Vessels bound southward from Nossi-Bé are at their greatest distance offshore in this vicinity and encounter a heavy sea ; for this reason many vessels proceed inside the outer reef, keeping near the coast..

- 15 A vessel approaching from northward can steer along the coast, or with Pointe de Marolahy bearing  $207^\circ$ , until Pointe Maromony is in line with Nosy Soy, bearing about  $074^\circ$ , when she will be southward of Diamond bank ; she should then steer with the latter transit, astern, until Pointe de Marolahy bears  $180^\circ$ . This latter point, as already stated, should be given a berth of not less than one mile.

In good weather vessels can anchor almost anywhere off this part of the coast in depths of from 11 to 13 fathoms ( $20^m1$  to  $23^m8$ ), mud.

*Chart 377.*

- CHANNELS THROUGH OUTER REEF.—PASSES de Mahajamba.**—Passes de Mahajamba, comprising Passe du Nord (North-pass) and Grande Passe, situated about 20 miles north-north-westward of the entrance to Baie de Mahajamba, are the north-easternmost of the channels through the outer reef leading to this bay ; Grande Passe is the wider and safer of these two channels. Masiaposa (*Lat.*  $15^\circ 30' 13''$  S., *Long.*  $47^\circ 10'$  E.) is the best landmark in this vicinity.

A vessel should steer through Grande Passe with Pointe Ambararata, the south-western entrance point of Baie de Mahajamba, bearing a little more than  $135^\circ$ , so as to pass north-eastward of a 10-fathom ( $18^m3$ ) coral patch lying about 16 miles north-westward of this point.

- 35 **Passe de Namakia.**—Passe de Namakia, about 8 miles south-westward of Grande Passe, lying between Banc du Boursaint and Banc du Vigilant, is about  $4\frac{1}{2}$  miles wide between the 5-fathom ( $9^m1$ ) lines.

- Banc du Boursaint, with a least charted depth of 4 fathoms ( $7^m3$ ) over it, the northern end of which lies about 16 miles north-westward of Pointe Ambararata, extends about  $5\frac{1}{2}$  miles south-south-westward.

Banc du Vigilant, with a charted depth of 3 fathoms ( $5^m5$ ), coral, over it, lies about 6 miles south-westward of Banc du Boursaint.

- Passe de Namakia can be easily navigated with the help of the various landmarks (*see* page 202). The red cliffs of Namakia, 203 feet ( $61^m9$ ) high, about 13 miles south-westward of Pointe Ambararata, only show up when the sun is shining on them ; there are some conspicuous sand dunes about  $1\frac{1}{2}$  miles west-south-westward of these cliffs.

- 50 A vessel can steer through the fairway of Passe de Namakia with the white patch, three-quarters of a mile southward of Pointe Manakara, in line with Masiaposa, bearing  $097^\circ$ , but a look-out should always be kept from aloft.

*Charts 758, 2762, 597, 748a, 748b.*

*Charts 377, 378.*

**Passe de Tsimanenoakoho.**—Passe de Tsimanenoakoho, about  $7\frac{1}{2}$  miles south-westward of Passe de Namakia, lying between Banc de la Romanche and Banc du Vaudreuil, is about  $1\frac{1}{2}$  miles wide between the 10-fathom ( $18^m3$ ) lines. Its position may be identified by it lying nearly opposite the first, and very marked, dip in the hills bordering the coast about 20 miles south-westward of Pointe Ambararata, and northward of the cliffs of Komany, 228 feet ( $69^m5$ ) high, about 9 miles further south-westward; these large red cliffs are streaked with blackish vertical stripes.

Banc de la Romanche, lying about 10 miles offshore, has a least charted depth of 2 fathoms ( $3^m7$ ) but, as the depths vary greatly, shoaler depths may exist; it is composed of gravel, white pebbles, broken red coral, and occasional patches of rock covered with seaweed. In fine weather, its presence is indicated by a bright green tint on the water, visible from some distance from aloft.

Banc du Vaudreuil and Banc du Forfait lie on the north-eastern and south-western ends, respectively, of a large coral bank about  $8\frac{1}{2}$  miles offshore; there is a least charted depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) over Banc du Vaudreuil and of  $3\frac{1}{2}$  fathoms ( $5^m9$ ) over Banc du Forfait.

Saradrano, a yellowish plateau, 411 feet ( $125^m3$ ) high, with a somewhat conspicuous clump of trees on its summit, situated about 5 miles eastward of the red cliffs of Komany, bearing  $155^\circ$ , leads through the fairway of Passe de Tsimanenoakoho.

**Passe d'Andranolava.**—Passe d'Andranolava, about 8 miles south-westward of Passe de Tsimanenoakoho, lying between Banc du Forfait (*Lat.  $15^\circ 21' S.$ , Long.  $46^\circ 27' E.$* ) and Mariner bank, is about 2 miles wide between the 10-fathom ( $18^m3$ ) lines, and is very deep in mid-channel.

*Chart 378.*

Mariner bank, lying about 9 miles offshore, has two coral patches, one, with a depth of  $3\frac{1}{2}$  fathoms ( $5^m9$ ) over it, near its western end, and the other, with a depth of 4 fathoms ( $7^m3$ ), near the eastern end.

Passe d'Andranolava should be entered in the afternoon when the red cliffs of Komany and those of Ampajony, 240 feet ( $73^m1$ ) high, about 14 miles south-westward, show up well.

The description of the channels through the outer reef west-south-westward of Passe d'Andranolava is continued on page 209.

*Charts 377, 378.*

**Anchorage.**—In fine weather vessels using any of the channels described above can anchor almost anywhere between the outer reef and the coastal bank; the depths are moderate.

*Chart 377.*

**BAIE DE MAHAJAMBA.**—Baie de Mahajamba is entered between Pointe Manakara (page 202) and Pointe Ambararata, about 5 miles westward. It extends about 9 miles south-south-eastward where it narrows, and then opens out into a large shallow basin which has not been thoroughly examined; it was reported, in 1897, that the depths in this inner basin were from  $1\frac{1}{2}$  to 2 fathoms ( $2^m7$  to  $3^m7$ ) less than those charted.

**Aspect.**—From seaward Masiaposa (page 202), on the eastern side of the entrance, appears as a wooded plateau; Fausse Table (page 202), 8 miles east-north-eastward of Masiaposa, is very similar in appearance.

*Charts 758, 2762, 597.*

*Chart 377.*

On the western side of the entrance, close to Pointe Ambararata, is a thickly wooded plateau with two circular red cliffs; when the sun shines on the cliffs this plateau is conspicuous from westward; 5 a red water-course, formed by a torrent in the western circle of cliffs, is very conspicuous. Pain de Sucre (Sugar Loaf), close eastward of the red cliffs, is a bare red hill, 374 feet (114<sup>m</sup>0) high, which is conspicuous when seen from north-westward. Under all conditions Pointe Ambararata is easily identified by the striking contrast its 10 regular aspect presents to the rugged outlines of Ambohitsambo and Antranoamby, two wooded hills, situated about 8 miles southward and 10 miles south-south-westward, respectively, of the point; Ambohitsambo is 601 feet (183<sup>m</sup>2) high.

The coasts on both sides of the outer part of the bay are high and 15 wooded, some red cliffs, 390 feet (118<sup>m</sup>9) high, about 7 miles south-south-eastward of Pointe Ambararata, being conspicuous.

Several rivers flow into the head of this bay, and Rivière d'Ambenja flows into the bay, about 4½ miles southward of Pointe Ambararata. Rivière Mahajamba, which flows into the middle of the head of the 20 bay through a delta, is inaccessible on account of the mangrove swamps extending northward of the mouth.

**Dangers in north-western approach.—Clearing marks.**—Lyra bank (*Lat.* 15° 08' S., *Long.* 46° 56' E.), with a least depth of 3½ fathoms (5<sup>m</sup>9) over it, lies with its south-eastern extremity about 25 3 miles north-north-westward of Pointe Ambararata, and extends about 2½ miles north-westward.

Banc Intermédiaire, with a least depth of 2½ fathoms (4<sup>m</sup>6) over it, lies about 1½ miles north-north-westward of Pointe Ambararata.

Thetis bank, with a depth of 1½ fathoms (2<sup>m</sup>3) over it, extends 30 about half a mile north-north-eastward of Pointe Ambararata; the white patch, three-quarters of a mile southward of Pointe Manakara, in line with Masiaposa, bearing 097°, leads close northward of this bank, and Pain de Sucre, bearing 228°, leads between Banc Intermédiaire and Thetis bank.

35 **Islet and dangers in bay.**—The eastern side of the bay as far as Mangoaka, a village about 4 miles south-south-eastward of Pointe Manakara, is free from dangers; southward of this village the depths become irregular, and the coast is encumbered by shoals which extend as far as Nosy Longany or Manja, lying close offshore, about 3½ miles 40 south-south-eastward of the village. The ruins of a very old Arab building stand on Nosy Longany.

Between Pointe Ampasilava, about 1½ miles south-south-eastward of Pointe Ambararata, and Pointe Tsinjomantsy, about 9 miles south-eastward of the former point, the coast is fringed by a bank, with 45 depths of less than 3 fathoms (5<sup>m</sup>5) over it, extending as far as 8 cables offshore; this part of the coast is fringed in places by a coral reef.

A shoal, with a depth of 2½ fathoms (5<sup>m</sup>0) over it, the north-western end of which is situated about 4 miles south-south-eastward of Pointe Ampasilava, extends 1½ miles south-eastward; this shoal lies about 50 three-quarters of a mile offshore.

The head of the bay is encumbered with shoals to a distance of about 6 miles offshore.

**Directions.**—A vessel approaching from north-eastward must avoid the shallow bank extending one mile north-north-westward of

*Charts 758, 2762, 597.*

*Chart 377.*

Pointe Ambatomifoko (page 41); if coming from northward she should proceed through Grande Passe, as described on page 204, and thence steer to enter the bay, taking care to avoid the dangers in the north-western approach, described on page 206.

A vessel approaching from south-westward can pass either northward of Lyra bank or southward of Banc Intermédiaire.

**Anchorage.—Beacons.**—In the outer part of this bay vessels can anchor almost anywhere.

Vessels seeking a night's shelter from south-easterly winds will find good anchorage north-westward of Pointe Ambararata, in depths of from 7 to 8 fathoms ( $12^m8$  to  $14^m6$ ), mud, with Pointe Ambararata bearing  $125^\circ$ , and Pain du Sucre  $219^\circ$ .

There is anchorage south-eastward of Pointe Ambararata, which affords shelter from north-westerly winds, in depths of about 8 fathoms ( $14^m6$ ), mud, with Pointe Ambararata bearing  $311^\circ$  and the summit of the highest sand dune between that point and Pointe Ampasilava (Lat.  $15^\circ 13' S.$ , Long.  $46^\circ 59' E.$ ) bearing  $256^\circ$ .

Vessels making a stay during the winter will find shelter from north-westerly winds and swell off Ambenja, a village about 4 miles southward of Pointe Ampasilava, with Pointe Ampasilava bearing  $343^\circ$  and a large sand dune at the entrance to Rivière d'Ambenja bearing  $240^\circ$ , in depths of from 7 to 8 fathoms ( $12^m8$  to  $14^m6$ ), about  $3\frac{1}{2}$  cables from the coastal bank. A vessel drawing more than 16 feet ( $4^m9$ ) must use this anchorage with caution, as it consists of a pocket formed by the 5-fathom ( $9^m1$ ) line.

There is good anchorage, on the eastern side of the bay, off Mangoaka, with shelter from south-easterly winds; a vessel should anchor about  $7\frac{1}{2}$  cables offshore in depths of from  $5\frac{1}{2}$  to 6 fathoms ( $10^m1$  to  $11^m0$ ), mud, with Pointe Ambolibozo, 2 miles southward of Pointe Manakara, in line with Pointe Amboaniho, three-quarters of a mile south-south-eastward of Pointe Ambolibozo, bearing about  $343^\circ$ , and Masiaposa  $065^\circ$ .

There is well sheltered anchorage in the inner basin for small vessels with local knowledge, in a small bay westward of Tombée Manja, a hill, 253 feet ( $77^m1$ ) high,  $1\frac{1}{2}$  miles eastward of Nosy Longany, in depths of about  $4\frac{1}{2}$  fathoms ( $8^m7$ ), good holding ground; the western entrance point of this small bay is marked by two white baobabs and the eastern entrance point by two iron beacons, painted white. There are some warehouses and a small wooden building at the head of this bay. The marks just described do not show up well, and a vessel should anchor with Tombée Manja bearing  $060^\circ$ . The 5-fathom ( $9^m1$ ) line extends farther southward than is shown on the chart. The tidal streams in this bay are strong, the flood stream setting south-south-eastward and the ebb stream north-north-westward.

**Port facilities.**—Poultry can be obtained at Ambenja, the principal village in this locality, also at Andranoména, a village on the coast about  $5\frac{1}{2}$  miles north-eastward of Pointe Manakara. Cattle can be procured at Mangoaka.

*Charts 377, 378.*

**COAST.—Aspect.**—From Pointe Ambararata the coast trends about 48 miles south-westward to the entrance to Baie de Bombétoké, and by day vessels can proceed safely along this stretch of coast at a

*Charts 758, 2762, 597, 748a, 748b.*



*Charts 377, 378.*

distance of about  $3\frac{1}{2}$  miles offshore ; at night they should not proceed into depths of less than 8 fathoms (14<sup>m</sup>6).

The coast presents an almost uniform appearance, and is formed of comparatively low cliffs fringed by a sandy beach ; these cliffs are mostly wooded, but where they are bare have a reddish colour.

*Chart 377.*

The red cliffs of Namakia, about 13 miles south-westward of Pointe Ambararata, and some conspicuous sand dunes about  $1\frac{1}{2}$  miles further south-westward, are described on page 204.

*Charts 377, 378.*

Rivière Tsimanenoakoho flows into the sea about  $7\frac{1}{2}$  miles south-westward of the conspicuous sand dunes mentioned above ; the entrance to the river can be identified by Angoaka (*Lat. 15° 24' S., Long. 46° 44' E.*), a hill, 407 feet (124<sup>m</sup>0) high, on which stands a conspicuous tree, about  $5\frac{1}{2}$  miles eastward of the northern entrance point, and by Saradrano (page 205), a hill about  $3\frac{1}{2}$  miles southward of the same point.

Nearly midway, and at a short distance inland, between Pointe Ambararata and the entrance to Baie de Bombétoke, is a series of vertical marks on a red ground which, when seen from the sea, resemble fortifications, and make a good landmark.

Pointe Komany is situated about  $4\frac{1}{2}$  miles south-westward of the entrance to Rivière Tsimanenoakoho, and about three-quarters of a mile south-westward of this point a stream of the same name flows into the sea ; this point can be identified by two red triangular cliffs immediately north-eastward of the red cliffs of Komany (page 205).

Rivière Andranolava flows into the sea about  $2\frac{1}{2}$  miles west-south-westward of the red cliffs of Komany ; its entrance is encumbered with shoals, through which there is only a boat passage at low water.

*Chart 378.*

The red cliffs of Ampajony (page 205) can be easily distinguished from the other red cliffs described above by some white cliffs situated about one mile south-westward.

*Charts 377, 378.*

**Coast.—Dangers.**—Between Pointe Ambararata and the entrance to Baie de Bombétoke the coast is fringed by a shallow bank, but there are numerous gaps in this bank which afford easy access to the coast.

*Chart 377.*

A detached shoal, with a depth of  $2\frac{1}{2}$  fathoms (4<sup>m</sup>1) over it, lies about  $4\frac{1}{2}$  miles west-south-westward of Pointe Ambararata and half a mile offshore.

A detached shoal, with a depth of a quarter of a fathom (0<sup>m</sup>5) over it, lies about  $3\frac{1}{2}$  miles west-south-westward of the red cliffs of Namakia and one mile offshore.

*Charts 377, 378.*

Rivière Tsimanenoakoho has depths of 8 feet (2<sup>m</sup>4) over the bar and of from  $2\frac{1}{2}$  to  $5\frac{1}{2}$  fathoms (5<sup>m</sup>0 to 10<sup>m</sup>1) within, but this river should only be entered by small vessels with local knowledge ; sandbanks and shoals extend about  $1\frac{1}{2}$  miles offshore in this vicinity.

The village of Marosakoa is situated on the southern side of the entrance to Rivière Tsimanenoakoho.

A shoal, with a depth of  $1\frac{1}{2}$  fathoms (2<sup>m</sup>7) over it, the position of

*Charts 758, 597, 748a, 748b.*

*Charts 377, 378.*

which is doubtful, lies about  $6\frac{1}{2}$  miles northward of Pointe Maromanjo, the western entrance point of Rivière Andranolava; another shoal, the existence of which is doubtful, is reported to lie about  $7\frac{1}{2}$  miles north-westward of the same point. 5

Sandbanks extend about 2 miles offshore from the mouth of Rivière Andranolava.

*Chart 378.*

A reef, which dries 10 feet ( $3^m0$ ), lies on the coastal bank, about  $1\frac{1}{2}$  cables offshore and  $8\frac{1}{2}$  miles south-westward of Pointe Maromanjo 10  
(Lat.  $15^{\circ} 31' S.$ , Long.  $46^{\circ} 30' E.$ ).

The coast, about  $3\frac{1}{2}$  miles south-westward of this reef, is fringed by a coral reef as far as the entrance to Baie de Bombétoke.

**Channels through outer reef** (continued from page 205).—**Passe d'Ampajony.**—Passe d'Ampajony lies between Mariner bank (page 15 205) and Euryalus bank, about  $5\frac{1}{2}$  miles westward; in its centre lies a bank, with a least depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ) over it, which should be avoided as there may be less depths than those charted, and a swell is experienced here.

Euryalus bank is a coral and gravel plateau, which has two heads 20 with depths of  $4\frac{1}{2}$  and 5 fathoms ( $8^m7$  and  $9^m1$ ), respectively, over them; the former head lies at the northern extremity of this bank and the latter about one mile south-westward.

A bank, with a least depth of 6 fathoms ( $11^m0$ ) over it, which should be avoided, lies about  $1\frac{1}{2}$  miles north-westward of the  $3\frac{1}{2}$ -fathom ( $5^m9$ ) 25 coral patch on Mariner bank.

The only landmarks visible from outside this pass are Ampajony bluff, 240 feet ( $73^m1$ ) high, situated about 7 miles south-westward of Pointe Maromanjo, and Massif de Katsépé, 368 feet ( $112^m2$ ) high, about  $9\frac{1}{2}$  miles west-south-westward of Ampajony bluff; these two 30 landmarks appear like two islands separated by a wide opening, and may be identified by their red cliffs, the former being especially easy to identify.

**Passe de Katsépé.**—Passe de Katsépé, between Euryalus bank and Turquoise bank, about 7 miles south-westward, cannot be recommended 35 on account of the lack of landmarks and two banks lying in the fairway; the easternmost of these two banks, about 2 miles south-westward of Euryalus bank, has a least depth of  $6\frac{1}{2}$  fathoms ( $11^m9$ ) over it, and the western, with a least depth of  $5\frac{1}{2}$  fathoms ( $9^m6$ ), lies about  $1\frac{1}{2}$  miles west-south-westward of the former. 40

Turquoise bank is a large coral plateau, with two  $4\frac{1}{2}$ -fathom ( $8^m7$ ) patches and one 5-fathom ( $9^m1$ ) patch.

*Charts 377, 378.*

**Anchorage.**—Small vessels with local knowledge find good shelter from westerly winds off the village of Marosakoa. 45

Beef and fowls are obtainable at Marosakoa.

*Chart 701.*

**BAIE DE BOMBÉTOKE.**—Baie de Bombétoke, which is entered between Pointe Anorombato and Pointe Katsépé, about  $3\frac{1}{2}$  miles westward, extends about 9 miles south-south-eastward, and then 50 opens out into the delta of Rivière Betsiboka, which river flows into this bay from south-eastward.

**Aspect.—Landmarks.—Beacon.**—The conspicuous red cliffs of

*Charts 378, 759a, 758, 597, 748a, 748b.*

*Chart 701.*

Ampajony, about  $5\frac{1}{2}$  miles north-north-eastward of Pointe Anorombato, are described on page 208.

Amborovy (*Lat.  $15^{\circ} 40' S.$ , Long.  $46^{\circ} 20' E.$* ), a wooded hill, is situated on the eastern side of the northern approach, about  $1\frac{1}{2}$  miles south-south-westward of the red cliffs of Ampajony, and thence the coast southward is low, wooded, and fringed by a coral reef, which dries in parts; a conspicuous sandhill is situated near the coast about  $3\frac{1}{2}$  miles south-south-westward of Amborovy.

Pointe Anorombato is high, and on its summit are some buildings and a light-tower; the plateau extending about three-quarters of a mile eastward and south-eastward of the point is called Colline de Roava. On the summit of Colline de Roava are some buildings surrounded by trees and vegetation; a radio mast stands on the western part of this plateau.

Ambondro, a hill 135 feet (41<sup>m</sup>1) high, is situated about  $2\frac{1}{2}$  miles east-north-eastward of Pointe Anorombato; and is covered with mango trees.

Massif de Katsépé, the highest point on the western side of the entrance, is described on page 209; it is wooded, with a conspicuous tree on its summit, and on its northern slope stands a conspicuous light-tower. Pointe Katsépé, the eastern extremity of Massif de Katsépé, is 177 feet (53<sup>m</sup>9) high, with its summit covered by trees; about 3 cables south-south-eastward of Pointe Katsépé, at the foot of the cliffs, is a conspicuous white patch shaped like a sail.

The coast between Pointe Katsépé and a village of the same name, about  $2\frac{1}{2}$  miles south-south-eastward, is high, wooded, steep, and fringed by a reef; Katsépé stands on a low point, and there is a beacon about  $2\frac{1}{2}$  cables south-westward of the village.

Massif de Kandranjy, about 320 feet (97<sup>m</sup>5) high, situated about  $3\frac{1}{2}$  miles southward of Massif de Katsépé, has a well defined summit, with wooded slopes, and is a useful landmark when approaching from north-eastward.

Pointe de Sable, about 7 cables south-south-eastward of Pointe Anorombato, is low and sandy; on it stands a conspicuous light-tower; there is a flagstaff on this point, but it cannot be seen from seaward.

The town of Majunga extends from the southern slope of Colline de Roava to Pointe de Sable.

Between Pointe de Sable and Pointe d'Ampirimpirina, about 5 miles southward, the coast recedes forming a bay; several rivers flow into the eastern part of this bay through mangrove swamps. The south-eastern shore of the bay, behind Nosy Beza or Ile Verte,  $2\frac{1}{2}$  miles south-eastward of Pointe de Sable, is high and wooded; the village of Ambatolampy is situated on this high land, which slopes down to the southern bank of the river of the same name, which flows into the bay about  $1\frac{1}{2}$  miles east-north-eastward of Nosy Beza.

Pointe Boinaomary, about 2 miles south-south-eastward of Pointe d'Ampirimpirina, is clifty and steep-to; Amboaniho, an industrial village (*Lat.  $15^{\circ} 50' S.$ , Long.  $46^{\circ} 21' E.$* ), is situated about  $1\frac{1}{2}$  miles east-north-eastward of Pointe Boinaomary.

From Katsépé the coast trends to a point about  $3\frac{1}{2}$  miles south-south-westward; here it recedes forming, between this point and Pointe Maroloha, about  $3\frac{1}{2}$  miles south-eastward, an inlet which dries.

From Pointe Maroloha the coast trends about 2 miles southward to

*Charts 378, 759a, 758, 597.*

*Chart 701.*

Pointe Antahotsaniaomby, and is hilly; a white and yellow patch is situated near the coast, about midway between these points. A bank, which dries, extends as much as one mile offshore.

Ambondrombé, 417 feet (127<sup>m</sup>1) high, is situated about 3½ miles south-westward of Pointe Antahotsaniaomby and 2½ miles inland.

About 2½ miles east-south-eastward of Pointe Antahotsaniaomby is the Mahabo or Kandranikély mouth of Rivière Betsiboka.

**Tidal streams.**—In the entrance to Baie de Bombétoke the tidal streams are always strong. At the anchorage for large vessels off Majunga the flood stream attains a rate of 2 knots and the ebb stream of 4 knots, rendering landing here difficult. During the rainy season the flood stream, at neaps, sometimes becomes obliterated. Within the 3-fathom (5<sup>m</sup>5) line the tidal streams decrease rapidly in strength.

**Pilotage.**—A pilot can be obtained outside the harbour if requested previously by radio.

A boat, displaying the pilot flag, will indicate, if necessary, the safest anchorage.

**Lights.**—A light is exhibited at an elevation of 397 feet (121<sup>m</sup>0) from a grey metal tower, with a horizontal black band at its base, 115 feet (35<sup>m</sup>0) in height, situated about 5 cables north-north-eastward of Massif de Katsépé.

A light is exhibited at an elevation of 118 feet (36<sup>m</sup>0) from a white metal tower, with a horizontal black band, 30 feet (9<sup>m</sup>1) in height, situated on Pointe Anorombato.

A light marks the head of a jetty under construction, in 1939, about 4 cables north-westward of Pointe Anorombato light.

A light is exhibited at an elevation of 36 feet (11<sup>m</sup>0) from a white metal tower, with black horizontal bands, 30 feet (9<sup>m</sup>1) in height, situated on Pointe de Sable.

A light is exhibited from a white pillar situated at the head of the wharf at Majunga, about three-quarters of a cable eastward of Pointe de Sable light, and another light from a column on the western angle of the Customs quay, about 1½ cables north-eastward of the former light.

Leading lights are exhibited on the eastern side of Baie de Bombétoke, the front light from a white framework, with a black horizontal band, situated on the south-eastern side of Nosy Beza, and the rear light from a white beacon, with black horizontal bands, surmounted by a white disc, 52 feet (15<sup>m</sup>8) in height, about 3 miles south-eastward of the front beacon.

*Chart 378.*

**Dangers in approaches.**—**Abnormal magnetic variation.**—A shoal, about one mile in extent, with a depth of 5 fathoms (9<sup>m</sup>1) over it, lies in the northern approach to Baie de Bombétoke, about 9½ miles northward of Pointe Anorombato (Lat. 15° 43' S., Long. 46° 18' E.).

*Chart 701.*

A shoal, with a least depth of 4½ fathoms (8<sup>m</sup>2) over it, the southern extremity of which is situated about 4½ miles northward of Pointe Anorombato, extends about 2½ miles north-north-westward; the southern part of this shoal is covered by a green sector of Pointe Anorombato light, between the bearings of 167° and 186°.

Narcissus bank, with a least depth of 1½ fathoms (2<sup>m</sup>3) over it, the south-eastern extremity of which is situated about 3½ miles northward

*Charts 378, 759a, 758, 597.*

*Chart 701.*

of Pointe Katsépé, extends about  $1\frac{1}{2}$  miles north-north-westward, and is covered by the *red* sector of Pointe Anorombato light, between the bearings of  $122^\circ$  and  $145^\circ$ .

- 5 Depths considerably less than those shown on the chart were reported, in 1939, in a position about  $6\frac{1}{2}$  miles north-north-westward of Pointe Anorombato; abnormal magnetic variation was also observed in this vicinity.

- 10 In the north-eastern approach to Baie de Bombétoko the coast is fringed by a bank, with depths of less than 5 fathoms ( $9^m1$ ) over it, which extends as far as  $1\frac{1}{2}$  miles offshore; Roche Antsahambingo, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ), lies on the western edge of this bank about  $1\frac{1}{2}$  miles north-north-westward of Pointe Anorombato and in a *white* sector of Pointe Anorombato light, between the bearings of  
15  $145^\circ$  and  $167^\circ$ .

*Chart 378.*

- Cavalier bank, lying on the western side of the approach to Baie de Bombétoko, is an irregular-shaped bank extending about 10 miles westward of Pointe Katsépé and to a distance of about 9 miles off-  
20 shore; it has depths of from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  fathoms ( $5^m9$  to  $8^m7$ ) over it, with two detached patches, one, with a least depth of  $1\frac{1}{2}$  fathoms ( $3^m2$ ), lying about  $5\frac{1}{2}$  miles north-westward of Katsépé light-tower, and the other, with a least depth of  $2\frac{1}{2}$  fathoms ( $5^m0$ ), about  $9\frac{1}{2}$  miles north-westward of the same light-tower.

*25 Chart 701.*

**Islet and dangers in Baie de Bombétoko.—Buoyage.—**

**Beacons.**—Rocher Ampangataha, 26 feet ( $7^m9$ ) high, lying on the coastal reef about  $1\frac{1}{2}$  cables north-north-westward of Pointe Katsépé, is not easily discernible.

- 30 A coral reef, which dries in parts, fringes the coast between Pointe Anorombato and Pointe de Sable.

- A shallow bank extends about 5 miles northward of Pointe d'Ampir-  
impirina, and is marked on its northern side by a light-buoy, painted  
in black and white horizontal bands, and exhibiting a *white flashing*  
35 *light every five seconds*.

The bay formed by the coast between Pointe de Sable and Pointe d'Ampirimpirina, is very shallow, and dries in parts.

- Nosy Beza (page 210), lying in the middle of the bay, is surrounded  
by a bank which dries; the light-beacon on this islet does not show  
40 up well.

- The coast, on the western side of the bay, is fairly bold for the first  
3 miles southward of Pointe Katsépé, but thence for  $6\frac{1}{2}$  miles to Pointe  
Maroloha it is fringed by reefs which dry and extend as far as  $1\frac{1}{2}$  miles  
offshore; these reefs are covered by mangroves. Detached shoals,  
45 with least depths of  $1\frac{1}{2}$  fathoms and half a fathom ( $3^m2$  and  $0^m9$ )  
over them, lie about  $2\frac{1}{2}$  cables east-south-eastward and 8 cables south-  
eastward, respectively, of Katsépé (*Lat.  $15^\circ 46'$  S., Long.  $46^\circ 15'$  E.*).

A conical buoy, painted red, surmounted by a red cone, lies on the  
edge of the 10-fathom ( $18^m3$ ) line,  $9\frac{1}{2}$  cables eastward of Katsépé.

- 50 The coast between Pointe d'Ampirimpirina and Pointe Antanandava,  
about  $1\frac{1}{2}$  miles south-south-eastward, is fringed in places by a coral  
reef and by a bank, which dries, and extends as far as  $5\frac{1}{2}$  cables offshore.

Pointe Bezezika, about  $1\frac{1}{2}$  miles eastward of Amboaniho, is 216 feet  
( $65^m8$ ) high, and on it stands an octagonal masonry beacon, 20 feet

*Charts 378, 759a, 758, 597.*

*Chart 701.*

(6<sup>m</sup>1) in height ; a rear beacon, consisting of a white octagonal structure, 39 feet (11<sup>m</sup>9) in height, is situated about 7½ cables eastward of the front beacon. These beacons were in ruins, in 1945.

**Channels.—Directions.**—There are four channels leading from seaward to Baie de Bombétoke, viz., Chenal du Nord-Est, Chenal du Nord, Chenal du Nord-Ouest, and Chenal de l'Ouest ; Chenal du Nord-Est and Chenal du Nord-Ouest may be used by large vessels, but Chenal du Nord and Chenal de l'Ouest are only available for small vessels with local knowledge.

There should be no difficulty in making Baie de Bombétoke *at night* on account of the various lights, but during the rainy season, i.e. from December to April, there are heavy and persistent squalls, and there may be several vessels at the anchorage off Majunga.

**Caution.**—When these channels are used during the ebb stream it is not unusual to see numerous red or discoloured patches of water, whilst the water over the shoals and banks in the neighbourhood appears much clearer ; this is caused by the muddy water flowing into the sea from the rivers. Deposits of mud, not shown on the charts, have been noticed in certain parts of these channels.

From November to January the leading light-beacons, principally the rear one, are difficult to identify in the morning with the sun behind them ; vessels should, therefore, if possible, arrive at the anchorage off Majunga in the afternoon.

**Chenal du Nord-Est.**—Chenal du Nord-Est lies between the coastal bank and the 4½-fathom (8<sup>m</sup>2) shoal 4½ miles northward of Pointe Anorombato ; a vessel using this channel, coming from north-eastward, should steer for Massif de Kandran bearing 212°, until the western extremity of Pointe d'Ampirimpirina bears 167°, which latter point should be steered for on that bearing until the light-beacon on Nosy Beza is in line with the light-beacon 3 miles south-eastward, bearing 132°, which leads about 1½ cables north-eastward of the light-buoy on the eastern side of the entrance to Baie de Bombétoke to the anchorage off Majunga, passing close north-eastward of the northern end of the shallow bank extending northward of Pointe d'Ampirimpirina. A vessel will be southward of Roche Antsahambingo when the rear leading light-beacon is in line with Pointe de Sable (*Lat.* 15° 44' S., *Long.* 46° 19' E.), bearing about 138°.

**Chenal du Nord.**—Chenal du Nord lies between the 4½-fathom (8<sup>m</sup>2) shoal mentioned above and Narcissus bank ; it has a least depth of 6 fathoms (11<sup>m</sup>0) in the fairway but, as stated on page 212, depths considerably less than those shown on the chart were reported, in 1939, in this vicinity. On account of the decrease in depths this channel is not recommended.

**Chenal du Nord-Ouest.**—Chenal du Nord-Ouest lies between Narcissus and Cavalier banks, and has a least depth of 7 fathoms (12<sup>m</sup>8) in the fairway. A vessel using this channel should steer with the south-western extremity of the land southward of Pointe d'Ampirimpirina bearing 152° and open north-eastward of Pointe Katsépé, which leads about 8 cables south-westward of Narcissus bank ; when a white house at the south-western extremity of Majunga bears 124° it should be steered for on that bearing until Nosy Beza light-beacon comes in line with the light-beacon 3 miles south-eastward, bearing 132°, when a vessel should proceed as previously directed.

*Charts 378, 759a, 758.*

*Charts 701, 378.*

*Chenal de l'Ouest.*—Chenal de l'Ouest leads over the southern part of Cavalier bank, passing between the coastal reef and the  $1\frac{1}{2}$ -fathom ( $3^m2$ ) patch  $5\frac{1}{2}$  miles north-westward of Katsépé light-tower, and has a least depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) in the fairway. Ambondro, bearing  $099^\circ$ , leads through the fairway of the channel, but this hill is difficult to identify; this bearing should be kept on until the leading light-beacons mentioned above come in line, bearing  $132^\circ$ , when a vessel should proceed as previously directed.

10 *Chart 701.*

**Anchorage.**—**Tidal streams.**—**Directions.**—Vessels proceeding to the anchorage off Majunga should approach with the leading light-beacons in line, bearing  $132^\circ$ , and anchor from 3 to 4 cables southward or south-south-westward of Pointe de Sable.

15 Small vessels with local knowledge can anchor a little farther eastward in depths of  $2\frac{1}{2}$  fathoms ( $5^m0$ ).

The tidal streams are strong at the anchorage, and the ebb stream from Rivière d'Amparihindro, which flows into the bay about 2 miles eastward of Pointe de Sable, meeting the ebb stream from the inner part of Baie de Bombétoke off Pointe de Sable, sometimes causes vessels to swing at right-angles to one another; the closer a vessel can approach the shore the less the tidal streams will be felt.

During the dry season, viz., from May to November, it is usually calm during the morning, but in the afternoon the sea-breeze causes 25 a choppy sea.

Vessels wishing to anchor farther up Baie de Bombétoke should, if leaving the anchorage off Majunga, steer north-westward with the leading light-beacons in line, astern, bearing  $132^\circ$ , until Pointe Anorombato light-tower bears  $075^\circ$  when course should be altered west-south-westward, keeping Pointe Anorombato light-tower astern on that bearing. When Pointe Maroloha (*Lat.  $15^\circ 52'$  S., Long.  $46^\circ 16'$  E.*) bears  $183^\circ$  it should be steered for on that bearing until the beacon  $2\frac{1}{2}$  cables south-westward of Katsépé is in line with Katsépé light-tower bearing  $333\frac{1}{2}^\circ$ ; this latter transit should be kept on, astern, until the 35 beacons on Pointe Bezezika are in line bearing  $079^\circ$ , when course should be altered eastward, keeping these beacons in line, for the desired anchorage. Pointe Bezezika beacons show up suddenly when a vessel is southward of Pointe Amboaniho, a promontory about 6 cables eastward of Pointe Boinaomary.

40 In the rainy season, from December to April, a vessel is liable to drag if anchored southward of Pointe Antanandava.

These inner anchorages are only available for small vessels with local knowledge.

**Port limits.**—The northern, western, and southern limits of the port 45 are as follows, the eastern limits, which are in depths of less than 2 fathoms ( $3^m7$ ), are omitted:—

From the root of the jetty about  $3\frac{1}{2}$  cables north-north-eastward of Pointe Anorombato light-tower, a line drawn in an  $000^\circ$  direction for a distance of 11 cables, thence in a  $270^\circ$  direction for  $32\frac{1}{2}$  cables, thence 50 in a  $231^\circ$  direction for  $12\frac{1}{2}$  cables, thence in a  $152^\circ$  direction for  $41\frac{1}{2}$  cables, thence in a  $180^\circ$  direction for about 64 cables to the northern extremity of Pointe Maroloha, thence towards Pointe Bezezika for a distance of  $45\frac{1}{2}$  cables, and thence in an  $040^\circ$  direction to the high water line. In addition, areas in the three main entrance channels

*Charts 378, 759a, 758, 597.*

*Chart 701.*

about three-quarters of a cable in width, on each side of the tracks indicated on the chart, and extending about  $16\frac{1}{2}$  cables beyond the limits, just described, are included in the port limits.

**Majunga.**—The town of Majunga, which is the capital of the province of that name, is situated on the eastern, southern, and north-western slopes of Colline de Roava; it had a population, in 1942, of 27,600.

There is an extensive system of wharves here available for small vessels with local knowledge. Harbour works were in progress, in 1939, about  $3\frac{1}{2}$  cables northward of Pointe Anorombato.

A British Consular officer is stationed at Majunga.

**Communications.**—There is regular steamer communication with the other Madagascan ports, also with Europe.

There is a regular river steamer service in Rivière Betsiboka.

Majunga is connected with the general telegraph system of Madagascar, and by cable with Mozambique.

There is a radio station at Majunga, *see* page 26.

**Port facilities.**—Fuel oil can be supplied in moderate quantities in 44-gallon drums, at a rate of 100 drums per hour.

Fresh provisions are obtainable. Water is supplied by water boats of 100 tons capacity.

Tugs and lighters are available.

There is a hospital for Europeans and natives on the plateau eastward of Pointe Anorombato (*Lat.*  $15^{\circ} 43' S.$ , *Long.*  $46^{\circ} 18' E.$ ), and an isolation hospital at Katsépé village.

Chronometers can be regulated at the radio station.

The harbour office is situated near Pointe de Sable light-tower.

**Rivière Betsiboka.**—**Tidal streams.**—The estuary of Rivière Betsiboka is very shallow, and it is encumbered with banks, which dry, and marshy islets, between which are numerous narrow channels; these banks, like the banks of the river, are mostly covered with mangroves, and their shapes are constantly changing.

The Manana mouth, on the north-eastern side of the entrance to Rivière Betsiboka, is the main channel, and small vessels with local knowledge can ascend the river by this channel for a distance of about 200 miles; the first landing place is the village of Maévarano, about 12 miles above Pointe Boinaomary.

The tidal streams in the estuary of Rivière Betsiboka, during the dry season, *viz.*, from May to November, attain a rate of from about a quarter of a knot to one knot during the flood tide and of about half a knot during the ebb, the flood stream setting from south to east and the ebb stream from west to north; during the winter the tidal streams attain a rate of 2 knots.

The tidal streams are felt for about 50 miles above the entrance to the river but, during the rainy season, *viz.*, from December to April, their influence may be completely overcome by the floods.

*Chart 378.*

**COAST.**—**Aspect.**—**Dangers.**—From Pointe Katsépé the coast trends about 10 miles westward and south-westward to the entrance to Baie Boina, and is hilly and wooded; it is fringed by a coral reef and bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, which extends as far as  $1\frac{1}{2}$  miles offshore; a detached shoal, with a depth of

*Charts 378, 759a, 758, 597.*



*Chart 378.*

2½ fathoms (5<sup>m</sup>0), lies about 6 miles west-north-westward of Katsépé light-tower.

Cavalier bank, extending west-north-westward of Pointe Katsépé, is described on page 212.

The entrance to Baie Boina is encumbered with reefs and shoals.

From the western entrance point of Baie Boina the coast trends about 17½ miles westward to Cap Tanjona, and is fringed by a bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it and which dries 10 in parts as much as 6 feet (1<sup>m</sup>8), extending as much as 4 miles offshore.

Several streams flow into the sea, through mangrove swamps, along this part of the coast; Rivière Namakia, the westernmost, flows into the sea about 6 miles east-south-eastward of Cap Tanjona, and between 15 the mouth of this river and the cape the coast rises gradually towards the latter.

Nosy Makamby (*Lat. 15° 43' S., Long. 45° 55' E.*), 231 feet (70<sup>m</sup>4) high, lies on the coastal bank about 5½ miles north-westward of the western entrance point of Baie Boina and about 2½ miles offshore; 20 from a distance it appears to be of a reddish colour, and is very conspicuous. It consists of a long narrow plateau falling precipitously on each side, terminating northward in a gentle slope and southward in several hillocks; at its northern end is a deep V-shaped notch. A 3-fathom (5<sup>m</sup>5) patch lies about 5½ miles west-north-westward of Nosy 25 Makamby and 6½ miles offshore.

The village of Ampitsipitsika is situated at the mouth of Rivière Namakia.

Cap Tanjona is fringed by white rocks, and is scored horizontally by bands of the same colour; its summit is flat, 345 feet (105<sup>m</sup>2) high, 30 and covered with vegetation to its extremity, where it descends in a gentle and slightly convex slope to the coast. The land within the cape is a plateau with a cleft in it, which makes it appear from a distance as two islands situated close to one another. The southern part is not so high as the northern part; it slopes gently at first and then 35 declines suddenly. Some smaller hills lie farther southward.

Cap Tanjona should not be approached closely as the 5-fathom (9<sup>m</sup>1) line lies about 1½ miles northward and 2½ miles east-north-eastward of it; a 5-fathom (9<sup>m</sup>1) coral patch lies about 3½ miles northward of the cape.

40 **Channels through the outer reef** (continued from page 209).—**Passe de Makamby.**—Passe de Makamby, about 5 miles south-westward of Passe de Katsépé, lies between Turquoise bank (page 209) and a coral bank about 1½ miles west-south-westward; this coral bank, with a least charted depth of 4 fathoms (7<sup>m</sup>3) over it, extends 45 about 11½ miles west-south-westward.

Nosy Makamby, about 13 miles distant from outside the pass, bearing 194°, leads through Passe de Makamby in depths of not less than 11 fathoms (20<sup>m</sup>1).

**Passe de Tanjona.**—Passe de Tanjona, about 12 miles west-south- 50 westward of Passe de Makamby, lies between the south-western end of the coral bank described above and Banc de la Thétis, about 3½ miles westward; Banc de la Thétis has a least depth of 2½ fathoms (5<sup>m</sup>0) over it, and from its western extremity a narrow ridge, with depths of less than 10 fathoms (18<sup>m</sup>3), extends about 17 miles west-south-west-

*Charts 759a, 758, 597.*

*Chart 378.*

ward. A vessel should avoid passing over this narrow ridge, as there may be less depths than are shown on the chart.

Passe de Tanjona is deep, and is one of the best and easiest of the channels through the outer reef; the north-western extremity of Cap Tanjona (*Lat.* 15° 46' S., *Long.* 45° 41' E.), bearing 204°, leads through the fairway of this channel. 5

**Anchorage.—Directions.**—Baie Boïna affords anchorage to small vessels with local knowledge; there are two channels leading into the bay, of which the eastern has been sufficiently examined for a vessel to attempt the passage. This latter channel, about 5½ miles east-south-eastward of Nosy Makamby, has a least depth of 4 fathoms (7<sup>m</sup>3) in the fairway, trends about 2½ miles south-south-eastward and thence turns sharply south-westward for about 2½ miles; at the turn in the channel there is a detached shoal, with a depth of 2½ fathoms (4<sup>m</sup>6) over it. 15

The only landmarks available are Nosy Makamby and Nosy Antseranandava (Autserandava islet); the latter islet, lying on the western side of the bay, 5½ miles south-eastward of the former islet, has a wooded summit. 20

It is necessary to take a pilot for entering this bay, or to mark the channel, as the water is muddy, and the bottom cannot be seen.

Landing is difficult except at high water. Beef can be obtained here.

Good anchorage is obtainable in depths of 5½ fathoms (10<sup>m</sup>1), mud, with the summit of Nosy Makamby bearing between south-west and west; this anchorage affords good shelter from south-easterly winds. 25

Good anchorage may also be obtained by small vessels with the northern extremity of Nosy Makamba, bearing 109°, distant 1½ miles. A vessel making this anchorage should steer south-westward towards Ampitsipitsika through the deep channel between Cavalier and Turquoise banks, anchoring between the 3 and 5-fathom (5<sup>m</sup>5 and 9<sup>m</sup>1) lines; the depths decrease gradually towards the shore. 30

*Charts 378, 758.*

**Coast.—Aspect.—Dangers.**—Between Cap Tanjona and Cap Amparafaka, about 26 miles west-south-westward, the coast is indented by Baie de Maroambitsy and Baie de Baly. 35

*Chart 378.*

Between Cap Tanjona and the eastern entrance point of Baie de Maroambitsy, about 5 miles south-westward, the coast is fringed by a reef and by a bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, which extends as much as 4½ miles offshore.

On the eastern side of the entrance to Baie de Maroambitsy a coral reef, covered with sand, extends as much as 5½ miles offshore; this reef is steep to at its western edge, and is not marked by any change in the colour of the water. 45

A bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it, extends as much as 1½ miles northward and 2½ miles eastward of the western entrance point of this bay.

Baie de Maroambitsy is the estuary of the Boteler and other rivers, which are thickly bordered with mangroves. A narrow and tortuous channel leads to the head of the bay where there is said to be anchorage for small vessels with local knowledge, but it is barred by a sandbank, with a least depth of 1½ fathoms (3<sup>m</sup>2) over it, lying about 1½ miles north-eastward of the western entrance point (*Lat.* 15° 58' S., *Long.* 50

*Charts 759a, 758, 597, 748a, 748b.*

*Chart 378.*

45° 34' E.); a vessel should not attempt to enter without previously marking the channel.

*Charts 708, plan of Boyanna bay; 378, 759a.*

- 5 Westward of the entrance to Baie de Maroambitsy the coast is low and thickly covered with brushwood, but about  $1\frac{1}{2}$  miles inland and near some hillocks westward of it, is Sommet Boteler, 191 feet (58<sup>m</sup>2) high, surmounted by a clump of large trees; Pointe Sada, 136 feet (41<sup>m</sup>5) high, about  $12\frac{1}{2}$  miles westward of the western entrance point of
- 10 Baie de Maroambitsy, is a regular plateau, and may be identified by its white cliffs.

The coast between Baie de Maroambitsy and Pointe Sada is fringed by a coral reef, covered with sand, and by a bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it, which extends as much as 2 miles offshore; at the edge of this bank, about 2 miles north-eastward of Pointe Sada, is a reef, which dries 6 feet (1<sup>m</sup>8). The reef eastward of Pointe Sada consists of several coral flats, of which nearly all the heads dry; it cannot always be distinguished by discoloured water, nor does the sea always break over it.

- 20 **Caution.**—Off this part of the coast, at certain seasons and in calm weather, the sea is often found covered for miles with a yellowish oily substance which, under the action of a breeze, breaks up into large patches; from the changes thus caused in colour of the water, this might be thought to indicate the presence of shoals. The cause,
- 25 however, is the diffusion of the seed of the mangrove washed out of the various rivers. This substance is found to have a strong scent resembling linseed.

*Chart 708, plan of Boyanna bay.*

- Baie de Baly.**—Baie de Baly is entered between Pointe Sada and
- 30 Cap Amparafaka.

A lagoon, the banks of which are covered with mangrove swamps, is formed by a neck of land extending about  $3\frac{1}{2}$  miles south-eastward from Pointe Sada, and lies on the eastern side of the entrance to the bay; the village of Marotia is situated at the south-eastern end of

35 this neck of land.

Cap Amparafaka, 91 feet (27<sup>m</sup>7) high, consists of reddish-coloured cliffs, surmounted by palm trees; it is a good landmark from westward.

- From Cap Amparafaka the western side of the bay rises and is covered with thick brushwood; about 7 miles southward of the cape
- 40 is a hill, 218 feet (66<sup>m</sup>5) high; the village of Baly, with a flagstaff, is situated about  $1\frac{1}{2}$  miles south-eastward of this hill.

On the eastern side of the head of the bay, about  $6\frac{1}{2}$  miles southward of Pointe Sada, are some red cliffs, crowned by trees, which break the uniform screen of mangroves bordering the head of Baie de Baly;

45 the village of Soalala is situated about half a mile south-south-westward of these cliffs.

**Tidal streams.**—The tidal streams in Baie de Baly attain a rate of 2 knots at springs.

- Dangers.**—Vigilant bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, extends about  $2\frac{1}{2}$  miles eastward of Cap Amparafaka (*Lat.* 15° 56' S., *Long.* 45° 16' E.), and the western side of the bay is fringed by a bank, with depths of less than 3 fathoms (5<sup>m</sup>5), which extends as far as  $1\frac{1}{2}$  miles offshore.

The dangers eastward and north-eastward of Pointe Sada are

*Charts 759a, 758, 597, 748a, 748b.*

*Chart 708, plan of Boyanna bay.*

described on page 218; a detached shoal, with a least depth of  $2\frac{1}{2}$  fathoms ( $5^m0$ ) over it, lies  $1\frac{1}{2}$  miles north-westward of this point.

A bank, with depths of less than 3 fathoms ( $5^m5$ ) over it and which dries near its edge west-south-westward of Marotia, borders the eastern side of the bay, and extends as far as  $2\frac{1}{2}$  miles offshore. 5

A shoal, with a depth of 5 fathoms ( $9^m1$ ) over it, lies in the fairway about  $2\frac{1}{2}$  miles west-south-westward of Pointe Sada.

The entrance to the lagoon described above is barred by shoals, and the inner part is mostly occupied by sandbanks. 10

The head of the bay is encumbered with shoals, some of which scarcely cover and others which dry.

**Directions.—Anchorages.**—A vessel entering the bay with the flood tidal stream must guard against being set towards Pointe Sada. She should steer for the 218-foot ( $66^m5$ ) hill, 7 miles southward of Cap Amparafaka, bearing  $209^\circ$ , until Pointe Sada bears  $090^\circ$ , when course should be altered south-south-eastward, steering for a conspicuous tree, the top of which is 101 feet ( $30^m8$ ) high, situated on the red cliffs on the eastern side of the head of the bay, bearing  $161^\circ$ , for the desired anchorage; when Marotia bears less than  $100^\circ$  the depths decrease quickly towards the head of the bay. 15 20

Vessels can anchor in depths of from 7 to 8 fathoms ( $12^m8$  to  $14^m6$ ), stiff mud, in the centre of the fairway, with Marotia bearing more than  $105^\circ$ .

This anchorage is well sheltered from westerly or north-westerly winds, which blow during the day in the dry season. South-easterly winds raise a choppy sea which, however, does not impede communication with the shore.

Small vessels wishing to communicate with Baly can obtain anchorage in depths of  $3\frac{1}{2}$  fathoms ( $5^m9$ ) about 3 miles north-eastward of this village. 30

Small vessels wishing to anchor off Baly can obtain anchorage about  $1\frac{1}{2}$  miles south-eastward of Pointe Tranofotaka, a promontory about one mile north-eastward of this village.

Soalala is the best landing place. It is not possible to land at Baly at low water. 35

Cattle, poultry, and eggs, can be obtained at Baly, Soalala, and Taranta, the latter a village situated  $3\frac{1}{2}$  miles east-north-eastward of Soalala.

*Chart 378.*

**OUTER REEF** (continued from page 201).—The narrow ridge extending 17 miles west-south-westward from Banc de la Thétis is remarked on on page 216. Barker bank, lying at the western edge of this ridge, about  $12\frac{1}{2}$  miles west-north-westward of Cap Tanjona (*Lat.  $15^\circ 46' S.$ , Long.  $45^\circ 41' E.$* ), has a least known depth of  $3\frac{1}{2}$  fathoms ( $6^m4$ ), but very probably there may be shoaler heads; it is visible, by day, from some distance in consequence of the change in the colour of the water over it, which appears bright green, with large yellow patches, and is specially marked near mid-day. 40 45

*Charts 378, 758.*

Westward of Barker bank lies an unnamed pass, about 2 miles wide, with depths of from 10 to 18 fathoms ( $18^m3$  to  $32^m9$ ); thence the outer reef begins again and continues, with depths of from  $5\frac{1}{2}$  to 50

*Charts 759a, 758, 597, 748a, 748b.*

*Charts 378, 758.*

9 fathoms ( $10^m1$  to  $16^m5$ ) over it, for about 30 miles farther westward.

*Chart 758.*

- 5 Between the western extremity of this long bank and Banc de la Grenouille, about 33 miles westward, there are several shoal heads, with deep channels between them; the least depth found was  $6\frac{1}{2}$  fathoms ( $11^m9$ ), but there may be less water, as the survey is incomplete, and the *Grenouille*, who discovered the shoal in 1851, reported a least depth  
10 of  $4\frac{1}{2}$  fathoms ( $8^m3$ ). Banc de la Grenouille lies on the northern edge of Banc de Pracel, about 28 miles north-north-westward of Cap Saint-André.

*Chart 759a.*

- COAST.—Aspect.—Dangers.—**Between Cap Amparafaka and  
15 Cap Saint-André the coast forms a slight indentation; westward of Cap Amparafaka it consists of moderately high yellow sandy cliffs, with beaches between them.

- Dunes Mamelles (Paps), yellow sandhills, 154 feet ( $46^m9$ ) high, situated on the coast about 11 miles west-south-westward of Cap Ampa-  
20 faraka, are liable to be mistaken for Cap Ampafaraka when approaching from westward; the mouth of Rivière Marokafiry, about  $2\frac{1}{2}$  miles north-eastward of Dunes Mamelles, would appear to be more conspicuous than is shown on the chart.

- This part of the coast is backed by hillocks on one of which, 322 feet  
25 ( $98^m1$ ) high, situated about  $13\frac{1}{2}$  miles southward of Dunes Mamelles and  $8\frac{1}{2}$  miles inland, is a conspicuous yellow tree; Ambohitrosy, about 33 miles southward of this 322-foot ( $98^m1$ ) hill, with two conspicuous conical summits, of which the northern and highest attains an elevation of 2,520 feet ( $768^m1$ ), is the highest mountain in this vicinity.

- 30 Rivière Bikaoky and Rivière Behara flow into the sea about  $7\frac{1}{2}$  and  $12\frac{1}{2}$  miles, respectively, south-westward of Dunes Mamelles.

- Between the mouths of Rivière Behara and Rivière Belobaka, about  $14\frac{1}{2}$  miles westward, the coast is fringed with mangroves and by a coral reef, over which the sea breaks almost continuously, extending  
35 as much as 3 miles offshore; Rivière Manombo and Rivière Fola flow into the sea along this stretch of coast, about 7 miles south-westward and  $9\frac{1}{2}$  miles west-south-westward, respectively, of the mouth of Rivière Behara. The village of Belobaka (*Lat.*  $16^\circ 13' S.$ , *Long.*  $44^\circ 42' E.$ ) is situated on the southern side of the mouth of the river of the  
40 same name.

A detached coral shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m6$ ) over it, lies about  $1\frac{1}{2}$  miles northward of Belobaka.

- Between Belobaka and the village of Vilamatsana, about  $10\frac{1}{2}$  miles westward, the coast, which is covered by brushwood, is fringed by  
45 a reef of coral and sand extending as much as  $1\frac{1}{2}$  miles offshore; Belobaka and Vilamatsana are the most easily identifiable points on this part of the coast.

- Rivière Kasenja flows into the sea about 4 miles westward of Belobaka; a coral patch, which dries 3 feet ( $0^m9$ ), lies about  $1\frac{1}{2}$  miles  
50 north-eastward of the mouth of this river, and about one mile west-north-westward of the mouth of the same river and half a mile offshore are two coral patches, which dry 5 and 7 feet ( $1^m5$  and  $2^m1$ ), respectively.

*Charts 758, 597, 748a, 748b.*

*Chart 759a.*

Lynx reef, lying about 8 miles eastward of Cap Saint-André and  $1\frac{1}{2}$  miles offshore, dries 5 feet ( $1^m5$ ); the sea only breaks over it at intervals when it is covered, and no indication of its existence is given by a change of colour in the water.

Rivière de Vilamatsana flows into the sea about  $2\frac{1}{2}$  miles eastward of Cap Saint-André, and may be identified by two low white sand dunes, surmounted by clumps of casuarina trees, situated near the village of the same name; a bank of sand and coral, over which the sea almost always breaks, and which is steep-to at its northern edge, extends about  $2\frac{1}{2}$  miles offshore in front of the river's mouth. H.M.S. *Osprey* reported, in 1883, that there was no distinctive change of colour of the water over the northern edge of this bank.

Cap Saint-André, the north-western extremity of Madagascar, consists of level sandy ground covered with palm trees and other vegetation and terminating in a low sandy point, on which is situated the village of Bevilana; the village is surrounded by palm trees, and stands close northward of a clump of casuarina trees and of the only sandhill in the vicinity.

Cap Saint-André is difficult to identify, and care must be taken not to mistake the isolated casuarina trees southward of the cape for the clump southward of Bevilana.

Cap Saint-André is fringed by a bank, with depths of less than 5 fathoms ( $9^m1$ ), over which the sea breaks heavily, extending as much as 6 miles north-westward and 10 miles westward of it; the cape should be given a berth of from 10 to 15 miles.

**Caution.**—See page 218.

Vessels are cautioned not to remain in the vicinity of Cap Saint-André during the squally season, from November to April, as they will be exposed to great danger on a bank encumbered with shoals, where the sea is heavy, and the holding ground of coral bad.

**Current.**—The current in the vicinity of Cap Saint-André sets towards the coast.

**Anchorage.**—Vessels can anchor anywhere along the coast between Cap Amparafaka (*Lat.  $15^{\circ} 56'$  S., Long.  $45^{\circ} 17'$  E.*) and Cap Saint-André outside the 5-fathom ( $9^m1$ ) line; there is good holding ground of sand and mud.

Native craft enter Rivière Belobaka at high water, but Rivière Kasenja is only accessible for canoes.

Beef and fowls are obtainable at Vilamatsana.

*Charts 758, 597, 748a, 748b.*

## CHAPTER VIII

MADAGASCAR, WESTERN COAST—CAP SAINT-ANDRÉ  
TO CAP SAINTE-MARIE*Chart 597.***LOCAL WEATHER.**—*See pages 48-51.*

**COAST.—General remarks.**—The western coast of Madagascar extends from Cap Saint-André (*Lat. 16° 11' S., Long. 44° 28' E.*) to Cap Sainte-Marie, about 570 miles southward. This part of the coast is sparsely populated, and there are few harbours; the principal ports are Maintirano, Morondava, Morombé, and Tuléar.

Apart from Pracel bank, which fronts the coast from Cap Saint-André to about the parallel of 19° S., the depths in the approach to the western coast are great but, owing to their irregularity, the proximity of the coast is not indicated by soundings; numerous detached rocks front this coast rendering caution necessary when approaching it.

*Chart 759a.*

**15 Outlying islet and dangers.**—Juan de Nova, lying about 110 miles west-south-westward of Cap Saint-André and 75 miles offshore, the shoal 30 miles southward of Juan de Nova, and Bajo de Vinès, about 80 miles further southward are described on pages 141-142.

**20 Coast.—Aspect.—Dangers.**—From Cap Saint-André the coast, which is low and fringed by a sandy bank, trends about 12 miles southward; the coast is wooded, and at Antsanira, about 7 miles south-south-westward of the cape, there is a dark square clump of trees which is conspicuous.

From a position about 12 miles southward of Cap Saint-André the coast becomes cliffy for a further 20 miles southward, as far as the village of Marofototra (Marofotatra), and is backed by several conspicuous summits.

Vulture rock, lying on the coastal bank about 6 miles westward of Cap Saint-André, has a depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) over it; vessels must not pass eastward of this rock.

Milanja bank, the northern extremity of which is situated about 10 miles west-south-westward of Cap Saint-André, has a least depth of half a fathom ( $0^m9$ ) over it, and extends about  $3\frac{1}{2}$  miles south-south-westward.

**35 Rivière Sambao** flows into the sea about 18 miles southward of Antsanira, and Nosy Voalava (Nosi Valavo) lies on the coastal bank at the entrance to this river. Both mouths of Rivière Sambao are

*Charts 758, 597, 748a.*

*Chart 759a.*

closed by a bar, part of which dries, and the sea breaks over the remainder ; the banks at the entrance to the river are bordered with mangroves.

From Marofototra to Marotondro, about 7 miles south-westward, 6 the coast is composed of white cliffs, with red patches.

From Marotondro the coast trends about 27 miles south-south-westward to the village of Beravina ; it is low, backed by wooded ridges, and fringed here and there with mangroves, which indicate the mouths of rivers. Beravina is situated on a plateau near the mouth of Rivière 10 Ranobe, and may be identified by some high coconut trees.

Banc Mpanjaka, with a least depth of a quarter of a fathom (0<sup>m</sup>5) over it, lies about 15 miles west-south-westward of Marotondro and 10 miles offshore ; Récif Kiakala, which dries 6 feet (1<sup>m</sup>8), lies about 2½ miles south-south-eastward of Banc Mpanjaka. 15

A conspicuous tree, the top of which is 85 feet (25<sup>m</sup>9) high, situated about 9 miles south-south-westward of Beravina (*Lat.* 17° 12' S., *Long.* 44° 07' E.), resembles a sailing vessel.

The village of Tambohorano is situated near the coast about 21 miles south-south-westward of Beravina. The coastal bank, with depths of 20 less than 5 fathoms (9<sup>m</sup>1) over it, which is here named Banc de Tambohorano, has on it several shoal heads, over which the sea breaks, and extends about 5 miles offshore.

A detached shoal, with a depth of 1½ fathoms (3<sup>m</sup>2) over it, lies about 8 miles offshore west-north-westward of Tambohorano. 25

Vessels should give this part of the coast a wide berth.

*Chart 2461.*

Baie de Koraraika is entered between a point about 6 miles south-south-westward of Tambohorano and Cap Bepoaka, about 17 miles south-south-eastward ; Rivière Manambao flows into this bay, through 30 several mouths which have different names.

Cap Bepoaka, about 111 feet (33<sup>m</sup>8) high, is a steep cliff with uniformly flat ground in the vicinity, though a short distance southward the land rises slightly to two flat hills ; when the sun is shining on it it has a reddish-white colour rendering it very conspicuous. 35

Rivière de Magomba flows into the sea on the southern side of Cap Bepoaka, and on the southern side of its mouth is the village of Mitampy.

About three-quarters of a mile southward of Mitampy, near the coast, is a conical sand dune, 62 feet (18<sup>m</sup>9) high ; a large white dune, 40 68 feet (20<sup>m</sup>7) high, stands about 3 miles, and a large grey sand dune, 78 feet (23<sup>m</sup>8) high, about 4½ miles farther southward.

*Chart 759a.*

**Caution.**—The muddy water due to the numerous streams flowing into the sea prevents the shoals lying on the coastal bank from being 45 seen.

**Anchorage.**—There is anchorage, with good holding ground, all along this coast, but there is no shelter in case of bad weather.

Vessels can obtain anchorage, about 5 miles westward of the mouth of Rivière Sambao, in depths of 6½ fathoms (11<sup>m</sup>9). 50

*Chart 2461.*

Small craft, with local knowledge and a draught not exceeding 6 feet (1<sup>m</sup>8), can obtain shelter in a river in the vicinity of Tambohorano.

Anchorage can be obtained north-westward of Cap Bepoaka.

*Charts 759a, 597, 748a.*



*Chart 759a.*

**PRACEL BANK.**—This extensive bank, which, as already stated, fronts the coast from Cap Saint-André (*Lat. 16° 11' S., Long. 44° 28' E.*) to about the parallel of 19° S., extends as much as 56 miles offshore, and is steep-to on its seaward side; the soundings in many parts indicate a very uneven bottom, principally sand and coral.

**Caution.**—During the five months the *Ranca* spent in this vicinity, in 1901, it was noticed that dangers were seldom met with where the colour of the water would seem to suggest them, and sounding constantly revealed dangers which the look-out man had not reported.

Unless vessels are bound to some part of the coast within this bank, they should keep outside it altogether when navigating the Mozambique channel.

**Currents.**—On Pracel bank the currents are very irregular, and may set north-westward, south-eastward, or south-westward, and may attain a rate of  $1\frac{1}{2}$  knots.

**Islets and dangers.**—Chesterfield islet, lying about 29 miles south-westward of Cap Saint-André, consists of a large black rock, 10 feet (3<sup>m</sup>0) high, fringed by a reef covered with sand, over which the sea breaks heavily; a rock, which just uncovers, lies about  $1\frac{1}{2}$  miles south-westward of the islet. It can be seen by day at a distance of from 6 to 8 miles. Vessels should give this islet a good berth at night, and of not less than 2 miles by day.

Vestal shoal, the northern extremity of which is situated about  $11\frac{1}{2}$  miles south-south-westward of Chesterfield islet, has a least depth of  $3\frac{1}{2}$  fathoms (6<sup>m</sup>9) over it, and extends about  $2\frac{1}{2}$  miles south-south-eastward; Flying Fish bank, lying about  $4\frac{1}{2}$  miles east-north-eastward of Vestal shoal, has a least depth of 8 fathoms (14<sup>m</sup>6), and extends about  $2\frac{1}{2}$  miles north-eastward.

Dart rocks, lying about 20 miles south-south-eastward of Chesterfield islet, dry 5 feet (1<sup>m</sup>5); these rocks are particularly dangerous as they are difficult to see.

About 30 miles south-westward of Dart rocks lies a bank with a least known depth of 6 fathoms (11<sup>m</sup>0), coral, over it, and about 17 miles west-south-westward of the latter is a shoal with a depth of  $6\frac{1}{2}$  fathoms (11<sup>m</sup>9) over it.

Flying Fish shoal, with a depth of 2 fathoms (3<sup>m</sup>7) over it, lies about 17 miles west-south-westward of Beravina and 11 miles offshore; a shoal, over which the sea breaks, lies about 11 miles westward of Flying Fish shoal.

Philomel shoal, with a depth of  $2\frac{1}{2}$  fathoms (5<sup>m</sup>0), over which the sea breaks, lies about 18 miles west-north-westward of Tambohorano; it can only be seen from a short distance. A  $4\frac{1}{2}$ -fathom (8<sup>m</sup>2) patch lies about  $1\frac{1}{2}$  miles north-westward of Philomel shoal.

Banc Volla (Vulla sand), lying about 16 miles west-north-westward of Tambohorano, consists of white sand, dries 13 feet (4<sup>m</sup>0), and can be seen in clear weather; a shoal, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies about  $1\frac{1}{2}$  miles south-south-eastward of Banc Volla.

Banc du Vaucluse, with a least depth of 6 fathoms (11<sup>m</sup>0) over it, lies about 20 miles westward of Banc Volla.

*Chart 2461.*

Nosy Vao (*Lat. 17° 29' S., Long. 43° 46' E.*), an uninhabited islet, about 10 miles westward of Tambohorano, is frequented by fishermen; it is low-lying, covered with grass, and fringed by a white sandy beach.

*Charts 759a, 597, 748a.*

*Chart 2461.*

In clear weather it can be seen from a distance of about 10 miles. A reef, awash, and steep-to, extends about one mile south-westward of this islet; detached coral heads make approach to its north-western and south-western sides dangerous. 5

Some detached shoals, with a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ), lie within  $3\frac{1}{2}$  miles west-north-westward of Nosy Vao; it has been reported that breakers have been observed 5 miles south-westward of this islet, but sounding has not discovered any danger in that area.

Passe de Nosy Vao, the channel between that islet and the coastal 10 bank, has moderate depths, and is about 2 miles wide.

Taunton Castle shoal, with a least depth of  $4\frac{1}{2}$  fathoms ( $7^m8$ ), coral, over it, lies about 19 miles south-south-westward of Nosy Vao.

Banc Lorho, with a least depth of 6 feet ( $1^m8$ ) over it, is a coral reef lying about  $18\frac{1}{2}$  miles west-south-westward of Cap Beпоaka. 15

Banc de l'Ouest (West shoal), lying about 5 miles southward of Banc Lorho, consists of three coral patches, the centre one of which dries one foot ( $0^m3$ ); a  $4\frac{3}{4}$ -fathom ( $8^m7$ ), patch lies about  $1\frac{1}{2}$  miles westward of the central coral patch.

The dangers eastward of Banc Lorho and Banc de l'Ouest, in the 20 approach to Maintirano, are described on pages 229-230.

A rock, the position of which is doubtful, was reported, in 1915, to lie about 15 miles westward of Banc de l'Ouest.

Banc de l'Emile-Héloïse, lying about 10 miles south-westward of Banc de l'Ouest, has a least depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ), coral, over it; 25 a  $3\frac{1}{4}$ -fathom ( $5^m9$ ) patch was reported, in 1883, by the *Emile-Héloïse* to lie near the middle of the bank.

A coral bank, about one mile in extent, with a least depth of 7 fathoms ( $12^m8$ ) over it, lies about 2 miles north-eastward of Banc de l'Emile-Héloïse. 30

*Chart 759a.*

Banc du d'Estaing, with depths of 9 fathoms ( $16^m5$ ) over it, was discovered by the vessel of that name, in 1883, about 25 miles west-south-westward of Banc de l'Ouest; although there was a heavy sea, it did not break over this bank. 35

**Tidal streams.**—Between Chesterfield islet and Cap Saint-André the tidal streams are usually regular, the flood stream setting southward and the ebb stream northward; occasionally a current will overcome the tidal streams, and set steadily in one direction for some time. 40

Observations of the tidal streams between Chesterfield islet and Beravina (*Lat.  $17^{\circ} 12' S.$ , Long.  $44^{\circ} 07' E.$* ) were made in July, August, and September, 1901, but the results were not very satisfactory; it was, however, found that the maximum rate was  $1\frac{1}{2}$  knots. The ebb stream sets westward between north and south-west, attaining its 45 maximum rate 4 hours after high water; the flood stream sets eastward, between north and south, attaining its maximum rate 3 hours before high water.

**Anchorage.**—Vessels can anchor in depths of from 8 to 10 fathoms ( $14^m6$  to  $18^m3$ ), sand and shells, moderate holding ground, about one 50 mile north-westward of Chesterfield islet.

Landing is possible, at high water and in very fine weather, on the east-south-eastern side of Chesterfield islet, but a boat should have a grapple out astern on account of the surf, which is often very heavy.

*Charts 759a, 597, 748a.*

*Chart 2461.*

There is anchorage northward of Nosy Vao in depths of 11 fathoms (20<sup>m</sup>1), with the centre of that islet, bearing 192°, distant one mile; this anchorage is well sheltered from winds between south and west.

- 5 The Messageries Maritimes vessels anchor in depths of 11 fathoms (20<sup>m</sup>1), muddy sand, with the western extremity of Nosy Vao bearing 219° and the eastern extremity 166°, distant 1½ cables.

Landing can be effected in a small bay formed by a tongue of sand at the eastern extremity of Nosy Vao.

- 10 **Barren islands and approaches.** Barren islands, lying on the southern part of Pracel bank, are seven in number, Nosy Mavony, Nosy Maroantaly, Nosy Androtra, Nosy Dondosy, Nosy Andrano, Nosy Manghily, and Nosy Lava; they are small and sandy, with coral reefs surrounding them, and can be seen from a distance of from 10 to 15 12 miles.

This part of Pracel bank is dangerous, as many of the shoals with which it is encumbered, cannot be distinguished in fine weather; the western side of the Barren islands group is near the western edge of the bank, whence the depths increase rapidly.

- 20 Bancs du Vaudreuil, lying about 7 miles north-westward of Nosy Mavony and 19 miles offshore, consist of two banks about 4 cables apart; the north-eastern bank has a least depth of 2½ fathoms (4<sup>m</sup>6) and the south-western of 2½ fathoms (4<sup>m</sup>1). The sea does not always break over any part of these banks; when over them, the water being 25 clear, the bottom is occasionally visible.

- Bayfield sand, an extensive reef of rocks and sand, lies about 5½ miles north-north-eastward of Nosy Mavony and 12½ miles offshore; at its eastern end is a bare sandbank, one foot (0<sup>m</sup>3) high, which can be seen from a distance of from 5 to 6 miles; the remainder of the reef dries 30 from one to 15 feet (0<sup>m</sup>3 to 4<sup>m</sup>6).

Surprise shoal, with a least depth of 1½ fathoms (3<sup>m</sup>2), coral, over it, lies about 3 miles south-eastward of the eastern extremity of Bayfield sand, and is steep-to.

- Albatross shoal, with depths of less than 6 feet (1<sup>m</sup>8) over it, lies 35 about 3½ miles west-north-westward of Nosy Mavony (*Lat.* 18° 19' S., *Long.* 40° 45' E.); it is not marked by any discoloration of the water, and the sea does not break over it.

- Banc du Mpanjaka, lying about 4½ miles west-north-westward of Nosy Mavony, with a least depth of 3 fathoms (5<sup>m</sup>5) at its south-western end, consists of several coral heads; it extends northward 40 towards Bancs du Vaudreuil and north-westward towards Banc de l'Emile-Héloïse. The sea breaks over Banc du Mpanjaka in bad weather.

- Nosy Mavony, the northernmost of the Barren islands, is 45 feet 45 (13<sup>m</sup>7) high, and is covered with bushes; a reef extends about 1½ miles south-westward of it. Amarella sand, lying about 1½ miles east-north-eastward of Nosy Mavony, is of coral, covered here and there with sand, and dries 12 feet (3<sup>m</sup>7); Banc du Milieu, lying between Nosy Mavony and Amarella sand, dries 10 feet (3<sup>m</sup>0).

- 50 Nosy Maroantaly, lying about 11½ miles east-south-eastward of Nosy Mavony and 6½ miles offshore, is 16 feet (4<sup>m</sup>9) high, and shows up well; it is uninhabited, has only stunted vegetation, and is bordered by a reef which extends as much as three-quarters of a mile from it. A bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it, extends about

*Charts 759a, 597, 748a.*

*Chart 2461.*

three-quarters of a mile eastward of the north-eastern point of Nosy Maroantaly, and a  $4\frac{1}{2}$ -fathom ( $8^m7$ ) patch lies about three-quarters of a mile east-north-eastward of the same point.

Crescent reef and Banc Rontonina lie about  $2\frac{1}{4}$  miles northward and 3 miles north-north-eastward, respectively, of Nosy Maroantaly; the former dries 8 feet ( $2^m4$ ) and the latter 4 feet ( $1^m2$ ); the sea nearly always breaks over Crescent reef. A vessel should not pass between these reefs and the mainland.

Nosy Androtra, lying about  $7\frac{1}{4}$  miles west-south-westward of Nosy Maroantaly, is very conspicuous, being the only thickly wooded island of this group; on its northern part is a clump of casuarina trees, 101 feet ( $30^m8$ ) high, which has often been mistaken for a sailing vessel.

Banc du Boursaint and Lockwood reef, about  $5\frac{1}{4}$  miles west-north-westward and 2 miles southward, respectively, of Nosy Androtra, lie near the western edge of Pracel bank; Banc du Boursaint, which has a least depth of  $3\frac{1}{4}$  fathoms ( $6^m4$ ) over it, is often marked by a swell; Lockwood reef, over which the sea breaks heavily, dries.

These two dangers and Nosy Androtra lie on a coral bank, with depths of less than 10 fathoms ( $18^m3$ ) over it, which extends about 13 miles north-westward and  $2\frac{1}{4}$  miles eastward, respectively, of this island; a  $4\frac{1}{2}$ -fathom ( $8^m2$ ) patch is charted about  $1\frac{1}{4}$  miles eastward of Nosy Androtra.

Nosy Dondosy, 35 feet ( $10^m7$ ) high, lying about  $4\frac{1}{2}$  miles south-eastward of Nosy Androtra, is covered with grass; a coral reef extends about one mile westward and half a mile southward of it, and a shoal, with a depth of  $4\frac{1}{4}$  fathoms ( $8^m2$ ) over it, lies about  $3\frac{1}{4}$  miles west-south-westward of Nosy Dondosy. There is a boat channel, about three-quarters of a mile wide, between Nosy Dondosy (*Lat.*  $18^\circ 33' S.$ , *Long.*  $43^\circ 52' E.$ ), on the north-western side, and Nosy Andrano and Nosy Manghily, on the south-eastern side.

Nosy Andrano and Nosy Manghily, both of which are sparsely wooded, lie on the same reef, which extends about half a mile northward of Nosy Andrano and  $1\frac{1}{4}$  miles south-south-westward of Nosy Manghily; a sandbank, which dries, connects these two islands. There are some huts on Nosy Andrano, and a pyramid, 42 feet ( $12^m8$ ) high, stands on its eastern side.

A channel, about three-quarters of a mile wide, with a least depth of 7 fathoms ( $12^m8$ ) in the fairway, separates Nosy Andrano and Nosy Manghily from Nosy Lava, lying about  $2\frac{1}{4}$  miles south-eastward of Nosy Andrano.

Nosy Lava, 52 feet ( $15^m8$ ) high, is the southernmost and largest island of the group, and lies about 11 miles offshore; its northern part is rocky and covered with bushes, and there are some trees on its western extremity; there were four large houses on this island, in 1933. A reef extends about three-quarters of a mile westward and south-eastward of Nosy Lava.

There is a navigable channel between Nosy Lava and Simpson reef, about 2 miles eastward.

Simpson reef, 15 feet ( $4^m6$ ) high, has a shallow bank surrounding it.

There are several shoals between the Barren islands group and the mainland, the positions of which can best be seen on the chart, and there are probably others.

Purdy sand, or South reef, lying about  $8\frac{1}{4}$  miles south-south-east-

*Charts 759a, 597, 748a.*

*Chart 2461.*

ward of Nosy Lava, is the southernmost known danger on Pracel bank ; it consists of a coral reef, with a sandbank, 2 feet (0<sup>m</sup>6) high on its north-eastern part. The sea breaks heavily over this reef.

5 *Charts 2461, 759a.*

A shoal, with a depth of 2½ fathoms (5<sup>m</sup>0), coral, over it, lies about 4½ miles southward of Nosy Lava ; this shoal lies near the northern end of a bank, with depths of less than 10 fathoms (18<sup>m</sup>3), which extends about 11 miles southward of it.

10 *Chart 2461.*

**Tidal streams.**—The tidal streams between and around the Barren islands are strong and must be guarded against.

**Channels.**—There are three channels by which a vessel may pass through the Barren islands group.

- 15 The northern one passes between Banc de l'Ouest, on the north side, and Banc de l'Ernile-Héloïse and Bances du Vaudreuil, on the south side ; Bayfield sand (page 226) is a useful landmark for navigating this channel. The channel leads to the approaches to Maintirano.

- The next channel southward passes between Banc du Boursaint, on 20 the north-western side, and Lockwood reef and Nosy Androtra, on the south-eastern side ; the breakers over Lockwood reef assist in identifying the entrance to this channel. If a vessel is bound for Maintirano (*Lat.* 18° 04' S., *Long.* 44° 02' E.) a look-out must be kept for Surprise shoal.

- 25 The southernmost of the three channels, which is not as good as the other two, passes eastward of Purdy sand, thence a vessel should steer to pass between Nosy Lava and Simpson reef, whence course must be altered north-north-westward to pass westward of Nosy Maroantaly, and into the approaches to Maintirano.

- 30 **Anchorage.**—There are only two sheltered anchorages among the Barren islands.

- There is anchorage off the north-eastern end of Nosy Maroantaly in depths of 7 fathoms (12<sup>m</sup>8), mud, with the south-eastern extremity of that island bearing 219° and the south-western extremity of Crescent 35 reef 335°. Care must be taken to avoid the 4½-fathom (8<sup>m</sup>7) patch lying about a quarter of a mile south-south-eastward of this anchorage.

There is anchorage about 8 cables northward of Nosy Lava in depths of 7 fathoms (12<sup>m</sup>8), sand, with the eastern extremity of that island bearing 180° and the northern extremity of Nosy Andrano 290°.

- 40 The two anchorages described above are to be preferred, in bad weather, to the open roadstead off Maintirano.

- MAINTIRANO AND APPROACHES.**—**Beacon.**—The town of Maintirano is situated on Tronovasatra plateau, at the mouth of Rivière de Namela, about 11½ miles southward of Cap Bepoaka, and is 45 the seat of the local government.

Some fresh provisions can be obtained here.

- Maintirano-Maty, at one time an important town, about 6½ miles southward of Maintirano, is situated on a sandy islet at the mouth of Rivière d'Andemba Sud (South Andemba river), which as it approaches 50 the coast, expands into a large lagoon communicating with the sea by several passes, of which Maintirano pass, the central one, is the only one of importance ; the bar may, in favourable weather, be crossed by ship's boats, at or near high water, but from its liability to change, it

*Charts 759a, 597, 748a.*

*Chart 2461.*

is best to use native boats or employ a pilot. Coconut trees, the only ones in the neighbourhood, surround this town, and are thickest round its southern part.

Sarodrano, a village, on a branch of Rivière d'Andemba Sud, about a quarter of a mile westward of Maintirano-Maty, can be identified by a rectangular wooden beacon, 49 feet (14<sup>m</sup>9) in height, painted black and white, which stands at the southern end of the village; this beacon, which was reported destroyed, in 1937, is not easily distinguished, except in clear weather.

**Tidal streams.**—The tidal streams in the roadstead usually set northward, attaining a rate of from 1½ to 2 knots.

**Light.**—A light is occasionally exhibited at an elevation of 98 feet (29<sup>m</sup>9) from a white support, surmounted by a diamond with white vertical stripes, 36 feet (11<sup>m</sup>0) in height, situated on the Custom house flagstaff, close westward of Maintirano.

**Dangers.**—**Current.**—Banc du Nord (North reef), the westernmost of the off-shore dangers, lying about 9 miles westward of Maintirano, does not show up well; it is composed of coral, dries 4 feet (1<sup>m</sup>2) in parts, with Nosy Marify (*Lat. 18° 04' S., Long. 43° 52' E.*), a sandbank, awash, on its eastern side.

A current, often strong, sets eastward towards this reef.

Banc du Milieu (Middle reef), about 1½ miles eastward of the south-eastern end of Banc du Nord, dries one foot (0<sup>m</sup>3); spits, with depths of less than 3 fathoms (5<sup>m</sup>5) over them, extend about one mile, respectively, north-north-eastward and south-eastward of it.

Between Banc du Nord and Banc du Milieu lies a shoal, with a depth of 4 fathoms (7<sup>m</sup>3), coral, over it.

Banc du Sud-Est (South-East reef), about 2½ miles south-eastward of Banc du Milieu, has a least depth of 1½ fathoms (3<sup>m</sup>2), coral, over it; the sea breaks over this reef in bad weather.

Banc Santon, with a depth of one fathom (1<sup>m</sup>8), coral, over it, lies about 2½ miles south-south-eastward of Banc du Sud-Est; the sea breaks over this rock in bad weather.

Within the line of reefs described above is a chain of shoals extending parallel to the coast.

Banc d'Andolopanahy (Andolopanahi shoal), the northernmost of these shoals, lies with its north-eastern extremity about 4½ miles north-north-westward of Maintirano, has a least depth of 1½ fathoms (2<sup>m</sup>7) over it, and extends about 1½ miles south-westward; the presence of this shoal, in spite of the muddy water which prevents it being seen, is indicated by the sea always breaking over it.

Banc Ouest d'Anakao (West Anakao shoal), Banc Est d'Anakao (East Anakao shoal), and Banc de Namela (Namela shoal), with least depths of 2, 1½, and 2 fathoms (3<sup>m</sup>7, 2<sup>m</sup>7, and 3<sup>m</sup>7) over them, respectively, extend southward from Banc d'Andolopanahy for about 3½ miles; the sea breaks over these banks in bad weather.

A narrow bank, with depths of less than 5 fathoms (9<sup>m</sup>1) over it, extends about 2½ miles south-south-westward of the southern extremity of Banc de Namela to within one mile of Banc Santon; a shoal, with a depth of 4½ fathoms (7<sup>m</sup>8), gravel, lies in Passe du Sud (South pass), the channel between Banc Santon and the narrow bank just described.

Between the shoals described above and Banc du Milieu, eastward

*Chart 2461.*

of Banc du Nord, there are several other shoals, the positions of which can best be seen on the chart.

An obstruction, the position of which is doubtful, lies about 4 miles westward of Maintirano.

A shoal, with a depth of  $3\frac{1}{2}$  fathoms (5<sup>m</sup>9), on which the *Bagdad* struck, in 1913, lies about  $3\frac{1}{2}$  miles south-westward of Maintirano.

**Directions.**—Passe du Nord (North pass), between the mainland, on the eastern side, and Banc d'Andolopany, Banc Ouest d'Anakao, and Banc Est d'Anakao, on the western side, is only available for small vessels with local knowledge as there are neither beacons nor buoys. The water over the shoals is usually of a reddish-grey colour.

Passe du Sud, the principal channel for a vessel bound for Maintirano (Lat.  $18^{\circ} 04' S.$ , Long.  $44^{\circ} 02' E.$ ), is approached from westward or southward. If coming from westward a vessel should pass between Banc de l'Ouest, on the northern side, and Banc de l'Emile-Héloïse, Bancs du Vaudreuil, and Bayfield sand, on the southern side (see page 228); she should then steer with Sarodrano beacon bearing  $110^{\circ}$ , so as to pass southward of Banc du Nord, until the flagstaff at Maintirano bears  $042^{\circ}$ , when it should be steered for on that bearing; the former bearing leads close northward of Banc Santon and the latter bearing close north-westward of this rock and of the shoal, with a depth of  $4\frac{1}{2}$  fathoms (7<sup>m</sup>8) over it, 4 cables north-eastward of Banc Santon. A vessel must be careful not to get north-westward of the track leading towards Maintirano so as to pass south-eastward of the Bagdad shoal; when Sarodrano beacon bears  $146^{\circ}$  a vessel will be north-eastward of this shoal, and a northerly course may be steered for the anchorage. Sarodrano beacon has been reported as not easily distinguishable, except in clear weather. See page 229.

If a vessel has approached Maintirano from southward, as directed on page 228, after having passed eastward of Surprise shoal, she should steer towards Banc du Nord, and then proceed as directed above.

**Anchorage.—Landmarks.**—It is advisable for vessels to arrive at the anchorage in the afternoon when the coast shows up well; vessels are not recommended to make or leave these anchorages at night.

Approaching Maintirano a white flagstaff, close westward of the town, will be seen; the Custom house, a white building with a red roof, surmounted by a flagstaff, stands on the coast, in front of the town, and is easily identified. The coconut tree, in front of the Custom house, shows up well; this tree, together with the Custom house, are, in a bad light, or during squalls, or at sunrise, often the only landmarks visible. The beacon at Sarodrano is described on page 229.

If requested by radio, the day before, a light is exhibited from the Custom house flagstaff.

There is anchorage in depths of  $3\frac{1}{2}$  fathoms (6<sup>m</sup>9), good holding ground, about 2 miles west-south-westward of Maintirano flagstaff, but in bad weather the anchorages described on page 228 are to be preferred.

Landing can be effected on the beach in front of the town, but there is some surf on the beach. Easier landing may be effected at Maintirano by passing through one of the boat channels leading into the estuary of Rivière de Namela; this is done by means of canoes which can pass over the bar at any state of the tide.

*Charts 759a, 597, 748a.*

*Chart 2461.*

Good anchorage in depths of 10 fathoms (18<sup>m</sup>3) can be obtained about half a mile north-eastward of Banc du Nord; this anchorage affords good shelter from the heavy south-westerly swell.

There is anchorage off Maintirano-Maty, but the anchorage off Maintirano is to be preferred as the former anchorage is entirely open to westerly winds which cause a heavy sea. The depths between Banc Santon and the coast decrease regularly. 5

**Port limits.**—Port limits are established at Maintirano (Lat. 18° 04' S., Long. 44° 02' E.); these limits may be ascertained from the port authorities, on arrival. 10

**Tidal streams.**—At the anchorage off Maintirano-Maty the ebb stream attains a rate of about half a knot at half-tide, and then sets south-westward; the flood stream attains about the same rate a little before half-tide, and then sets eastward. 15

**Communications.**—There is steamer communication with other Madagascan ports.

Maintirano is connected with the general telegraph system of Madagascar.

There is a radio station at Maintirano. See page 26. 20

**Signal station.**—**Storm signals.**—There is a signal station at Maintirano.

Signals indicating the locality threatened by a cyclone are displayed. See page 27.

*Charts 2461, 759a.*

**COAST.**—**Dangers.**—Southward of Maintirano-Maty the coast, low and wooded, has no salient features; it is intersected by streams with small villages at their mouths. 25

*Chart 2461.*

From Sarodrano the coast trends about 12 miles southward to the mouth of Rivière Ampandikoarana; Demoka Mati, a village, is situated on the northern side of the mouth of Rivière Demoka, which flows into the sea 4 miles southward of Sarodrano beacon. 30

Several detached shoals, with a least depth of 1½ fathoms (2<sup>m</sup>3), lie within about 3 miles of this part of the coast; Banc Bevoay, about 5½ miles south-south-westward of Sarodrano beacon and 1½ miles offshore, dries 3 feet (0<sup>m</sup>9). 35

*Charts 2461, 759a.*

From the mouth of Rivière Ampandikoarana the coast trends about 39 miles south-south-eastward to the northern mouth of Rivière Manambolo. 40

*Chart 2461.*

Pointe Antsavaky is situated about 10 miles south-south-eastward of the mouth of Rivière Ampandikoarana, and Pointe Namakia, 5½ miles farther south-south-eastward; Rivière Soahanina flows into the sea about 6 miles south-south-eastward of Pointe Namakia. 45

The Barrier islands and the dangers off-lying this part of the coast are described on pages 226-228.

*Chart 759a.*

A spit, with a least depth of three-quarters of a fathom (1<sup>m</sup>4) over it, extends about 10 miles south-westward from a point on the coast 10 miles south-south-eastward of Pointe Namakia. 50

Cap Kimby, about 6 miles northward of the northern mouth of

*Charts 759a, 597, 748a.*



*Chart 759a.*

Rivière Manambolo, shows up as a dark promontory with several conspicuous white patches.

Rivière Manambolo has several mouths, of which the northern, the Behenjavo, the principal one, is much used by local craft ; there is a military station at the village of Behenjavo (*Lat.* 19° 02' S., *Long.* 44° 15' E.).

A detached shoal, with a depth of 2½ fathoms (4<sup>m</sup>6) over it, lies about 15 miles southward of Cap Kimby and 2½ miles offshore.

10 Sohazo (Sahazo), a military station, about 16 miles south-south-eastward of the southern mouth of Rivière Manambolo, may be easily identified by a zinc roof, and a look-out station which shows above the trees.

Rivière Tsiribihina (River Sizibongi or Tsijobonina) flows into the sea through five mouths, the northern of which, Ambozaka, is situated about 18 miles southward of Sohazo ; the other mouths, named in order from northward, are the Ankazomai, Tsiribihina, Betsioka, and Namangoa. These five mouths are obstructed by shifting banks, over which the sea generally breaks, and should not be attempted without local knowledge.

Between the mouths of Rivière Tsiribihina the coast is low and bordered with mangroves ; shoal water extends some distance offshore and, at times, the muddy water of the delta has a reddish colour as far as 7 or 8 miles offshore.

25 The principal mouth, the Tsiribihina, can be identified by a large village, Tsimanandrafoza, situated on the north-eastern side of the mouth, where there is a large white house ; a large clump of coconut trees is situated about half a mile southward of this white house.

Ilôt Indien (Indian islet), at the northern end of which is a settlement, separates the Tsiribihina and Betsioka mouths.

From the delta of Rivière Tsiribihina the coast, which is low and does not show up well, trends about 29 miles south-south-westward to the mouth of Rivière Morondava, and is intersected by Rivière Kerindy and Rivière Tomitzy, which flow into the sea about 7 miles southward and 14 miles south-south-westward, respectively, of the delta ; Bosy, a village standing on a sandy point, at the entrance to a creek about half a mile south-westward of the mouth of Rivière Tomitzy, is the only conspicuous place on this part of the coast.

Discoloured water was reported, in 1935, about 6 miles south-westward of the southern extremity of Ilôt Indien.

A shoal, with a depth of 1½ fathoms (2<sup>m</sup>7) over it, lies about 8½ miles north-westward, and a 2-fathom (3<sup>m</sup>7) coral patch, on which the *Marechal Gallieni* struck, in 1935, about 3 miles north-westward, of Bosy ; a shoal, the position of which is doubtful, lies close south-eastward of this latter patch.

A shoal, with a depth of 4½ fathoms (8<sup>m</sup>7), mud, was reported, in 1915, to lie about 5 miles south-westward of Bosy and 2 miles offshore ; a rock, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies about one mile farther south-westward. The coastal bank in this vicinity was reported, in 1915, to be extending.

**Anchorage.**—The *Surprise*, between 1923 and 1934, anchored off the mouth of the Manambolo, in depths of 26 feet (7<sup>m</sup>9), about 2 miles outside the breakers, with a clump of coconut trees bearing 140°, the military station 114°, and the middle of the Behenjavo mouth 055°.

*Charts 597, 748a.*

*Chart 759a.*

There is good anchorage in depths of 6 fathoms (11<sup>m</sup>0), mud, with the look-out station at Sohazo (*Lat.* 19° 20' S., *Long.* 44° 25' E.) bearing 079°.

Vessels can obtain anchorage off Tsimanandrafoza, about 2 miles offshore or one mile from the breakers, in depths of from 3½ to 4½ fathoms (5<sup>m</sup>9. to 7<sup>m</sup>8).

There is good holding ground, farther seaward, in depths of from 7 to 12 fathoms (12<sup>m</sup>8 to 21<sup>m</sup>9), with the clump of coconut trees half a mile southward of Tsimanandrafoza bearing between 055° and 065°; it is, as a general rule, better to anchor in the northern part of this sector.

Vessels can anchor about 2½ cables from the bar of Rivière Tsiribihina in depths of 6 fathoms (11<sup>m</sup>0), with the white house at Tsimanandrafoza bearing 139° and the clump of coconut trees half a mile southward bearing 122°.

The bar of the Tsiribihina is nearly always practicable in fine weather for coasters and native boats, but is nearly always dangerous for ship's boats. Communication with the shore is by native boats.

**Off-lying dangers and banks.**—The coast between Sohazo and Rivière Morondava is fronted by reefs and shoals extending as far as 27 miles offshore, but there may be other dangers than those shown on the chart so caution is necessary.

It has been remarked that when approaching a shoal it is not uncommon to see shoals of fish making considerable eddies in the water, and attracting flights of birds.

A bank, with a least depth of 4½ fathoms (8<sup>m</sup>7) over it, the northern extremity of which is situated about 15 miles westward of Cap Kimby, extends about 24 miles southward, and about one mile south-south-eastward of the southern end of this bank a reef extends about 5 miles south-south-eastward, and has rocks, with depths of less than 6 feet (1<sup>m</sup>8) over them, at its northern and southern ends.

A bank, with a depth of 9 fathoms (16<sup>m</sup>5) over it, was reported, in 1914, by the *Vaucluse*, to lie about 6 miles west-south-westward of the south-eastern end of the reef just described.

A bank, with a least depth of 5 fathoms (9<sup>m</sup>1) over it, was reported by the *D'Estaing*, in 1888, to lie about 29 miles west-south-westward of Sohazo; another bank, with depths of from 7 to 18 fathoms (12<sup>m</sup>8 to 32<sup>m</sup>9), lies about 10 miles southward of this bank.

A shoal, with a depth of 2½ fathoms (5<sup>m</sup>0) over it, was reported, in 1888, by the *D'Estaing*, to lie about 19 miles west-south-westward of Ilot Indien; a rock, with a depth of less than 6 feet (1<sup>m</sup>8), lies about 5 miles southward of the D'Estaing shoal. The depths westward of the D'Estaing shoal are irregular.

Ruby shoal, the position of which is approximate, lying south-westward of the rock 5 miles southward of the D'Estaing shoal, was discovered by H.M.S. *Ruby*, in 1880; it has a least depth of 3½ fathoms (6<sup>m</sup>4) over it but, in 1935, had not been examined.

Banc Cordelière, with a depth of less than 6 feet (1<sup>m</sup>8) over it, lies about 14 miles north-westward of Morondava (*Lat.* 20° 18' S., *Long.* 44° 18' E.); the *Clan Malcolm*, in 1921, reported heavy breakers over this shoal during a moderate south-westerly swell. A 1½-fathom (2<sup>m</sup>7) patch lies close south-westward of Banc Cordelière.

A bank, with a least depth of 7 fathoms (12<sup>m</sup>8) over it, lies about 4 miles west-south-westward of Banc Cordelière.

*Charts 597, 748a.*

*Chart 759a.*

A rock, with a depth of less than 6 feet (1<sup>m</sup>8), over which the sea breaks, was reported, in 1920, by the Imérina, to lie about 16 miles westward of Morondava; a similar rock, over which the sea breaks, was reported by the Boursaint, in 1889, to lie about 8 miles farther eastward.

Ankaramay shoal, discovered in 1868, lies about 11 miles west-south-westward of Morondava, and has a least depth of 1½ fathoms (3<sup>m</sup>2) over it; there are several coral heads.

10 *Chart 759a, plan of Morondava.*

**Morondava.—Landmarks.**—The town of Morondava is situated on Nosy Miandroka, an island formed by the arms of Rivière Morondava. It can be identified by a group of coconut trees standing near the Residency, a stone building with a red tiled roof, also by a group of 15 coconut trees, 42 feet (12<sup>m</sup>8) high, standing on the coast in front of Ambondro, a village about 1½ miles south-south-westward of Morondava; a belfry, with two black and white horizontal bands, situated close southward of Ambondro, is conspicuous from southward.

Rivière Morondava, which is the main outlet of the produce of the 20 interior on this coast, flows into the sea through several mouths which are constantly changing; the principal arm of this river is, at present, the one flowing into the sea near Morondava, but its mouth almost dries.

Rivière Lovobé, a tributary of the Morondava, flows into the sea about 3 miles south-south-westward of the town; on the southern side 25 of its mouth is the village of Lovobé, with some coconut trees close southward of it.

The belfry of the Norwegian mission station, painted in red and white horizontal bands, situated about 2 miles up Rivière Morondava, is conspicuous when approaching from southward.

30 The coast between Morondava and Rivière Lovobé is low and wooded.

*Chart 759a, with plan of Morondava.*

**Tidal streams.—Current.**—At the anchorage off Morondava, about an hour before high water at springs, the flood tidal stream sets 35 northward at a rate of about three-quarters of a knot; about an hour before low water the ebb tidal stream sets south-westward at a rate of about half a knot. The tidal streams change about an hour after high and low water.

At neaps the streams are weak and variable, and set sometimes 40 northward, sometimes southward, at a rate of about a quarter of a knot.

South-westerly winds cause a north-east-going surface current, which attains a rate of one knot, and continues to run for several days after these winds have ceased to blow.

45 The tidal streams increase in strength towards the delta of the Rivière Tsiribihina (*Lat.* 19° 48' S., *Long.* 44° 24' E.).

*Chart 759a, plan of Morondava.*

**Signal station.—Storm signals.**—There is a signal station at Morondava.

50 Signals indicating the locality threatened by a cyclone are displayed. See page 27.

**Depths.**—It was reported, in 1943, that 2 fathoms (3<sup>m</sup>7) less than the charted depths exist about one mile north-westward of Morondava.

**Light.**—A light is exhibited at an elevation of 56 feet (17<sup>m</sup>1) from

*Charts 597, 748a.*

*Chart 759a, plan of Morondava.*

a pillar, painted white, on a white square base, situated about half a mile west-south-westward of the Residency.

**Beacons.**—The front of a pair of leading beacons stands about half a cable north-eastward of the Residency, and is conspicuous; the rear beacon which, on account of trees, is only visible about 10° on either side of the leading line, stands about 2 cables south-eastward of the front beacon; each beacon consists of a white pyramid with a broad black vertical stripe.

**Directions.**—**Anchorage.**—**Wharf.**—**Shoal.**—A vessel should give the coast a good berth until some of the conspicuous objects have been identified.

There is good anchorage in depths of about 6 fathoms (11<sup>m</sup>0), muddy sand, with the light-structure, bearing 139°, distant about 1¼ miles.

There is also good anchorage in depths of 5½ fathoms (10<sup>m</sup>1), muddy sand, with the beacons in line, bearing 131½°, and the belfry, close southward of Ambondro, bearing 180°.

The Messageries Maritimes vessels steer in with the group of coconut trees near the Residency bearing 120° until the belfry, close southward of Ambondro, bears 180°; they then anchor, on the latter bearing, in depths of 3¾ fathoms (6<sup>m</sup>9), sand and mud, good holding ground.

There is often a heavy swell in the roadstead.

A vessel can anchor here at night but, as Morondava light is not visible from the outer dangers, it is necessary for a vessel to have ascertained its position before closing the coast.

The entrance to Rivière Morondava is blocked by a sandy ridge, which is just covered in places; boats can only cross this bar in the morning within 2 hours before to 2 hours after high water. During the afternoon the breeze raises a heavy sea, and landing can then only be effected by means of canoes.

A stone wharf has been constructed for a distance of 1½ cables south-westward from the light-structure; small craft can lie alongside at high water, but care is necessary as a ledge projects about 6 feet (1<sup>m</sup>8) from the wharf, 4 feet (1<sup>m</sup>2) below water.

There is also anchorage off Lovobé; the holding ground here is good, the sea is less, and communication with the shore easy.

A shoal, with a depth of 1½ fathoms (3<sup>m</sup>2) over it, lies about three-quarters of a mile westward of the northern entrance point of Rivière Lovobé.

**Port limits.**—The limits of the port (*Lat.* 20° 18' S., *Long.* 44° 18' E.) are as follows:—

From a position situated 038°, distant 8¼ cables, from the light-structure, a line drawn in a 218° direction to the high water line, and a line drawn thence in an 000° direction for a distance of 12¼ cables, thence in a 270° direction for 2 miles, thence in a 180° direction for 2 miles, and thence in an 090° direction to the high water line.

**Communications.**—There is steamer communication with the other Madagascan ports.

There is a local boat service between Morondava and Bélo, a small town about 12 miles up the Tsiribihina.

Morondava is connected with the telegraph system of Madagascar.

**Port facilities.**—Fresh provisions are plentiful.

Tugs and lighters are obtainable from a private company.

*Charts 759a, 597, 748a.*

*Chart 759a, with plan of Morondava.*

**Coast.—Aspect.—Dangers.**—Between Morondava and Cap Ankarana, about 14 miles south-south-westward, the coast is intersected by the mouths of several rivers.

- 5 The shoal, with a depth of  $1\frac{1}{2}$  fathoms ( $3^m2$ ), three-quarters of a mile westward of the northern entrance point of Rivière Lovobé, is mentioned on page 235.

Rivière Taolampia flows into the sea about 3 miles south-south-westward of the mouth of Rivière Lovobé; here the dunes terminate  
10 in a low well-defined rounded hill, with a white patch on it.

*Chart 759a.*

- Cap Ankarana shows up well from northward; it consists of wooded cliffs, with black clumps of stunted bushes; Pointe Andriambé, the southern extremity of this cape, is black, and has the appearance of  
15 an island. Cap Ankarana is fringed by rocks.

The coast southward of Pointe Andriambé consists of a sandy beach.

Pointe Ambatomisiotaka, about 8 miles south-south-westward of Pointe Andriambé, is fringed by trees, and is conspicuous from northward.

- 20 The estuary of Rivière Bélo is situated about 8 miles south-westward of Pointe Ambatomisiotaka; Antraraka, a village, is situated on a sandy point forming the north-eastern entrance point of this estuary, at the extremity of which stands a flagstaff; a large one-storied house, with a zinc roof, is situated in the middle of this village; the position of  
25 Antraraka is reported to lie 4 miles farther southward and 3 miles farther westward than that shown on the chart.

A clump of casuarina trees stands about  $1\frac{1}{2}$  miles north-eastward, and a single isolated casuarina tree about one mile south-south-westward, of Antraraka, and are conspicuous.

- 30 Nosy Bélo lies about 2 cables westward of the flagstaff at the extremity of the north-eastern entrance point of the estuary.

Sandbanks, the positions and shapes of which change, front the estuary of Rivière Bélo, extending as much as  $1\frac{1}{2}$  miles offshore.

- From the delta of Rivière Bélo (*Lat. 20° 45' S., Long. 44° 00' E.*) the  
35 coast trends about 7 miles south-westward to the mouth of Rivière Kirindy; it is low and sandy, with several large isolated casuarina trees.

- Southward of Rivière Kirindy the coast is formed by high sandhills; Rivière Lampaolo flows into Baie de Mitehina (Mitchina bay), about  
40 5 miles south-south-westward of the mouth of Rivière Kirindy through a large cut in the steep sandhills, and Rivière Maitampaka (River Maintapaka or Maitampaki) flows into the sea about 10 miles southward of the mouth of Rivière Lampaolo.

*Chart 2464.*

- 45 Angoba, about 6 miles south-south-westward of the mouth of Rivière Maitampaka, is fronted by a ledge of rocks extending as much as half a mile offshore.

There is a large white sandhill on the coast about 2 miles southward of Angoba.

- 50 From Angoba the coast trends about 9 miles south-south-westward and thence 8 miles westward to Pointe Marohata, forming Baie d'Ampasilava.

*Chart 759a.*

**Caution.**—Between Morondava and Pointe Marohata the inshore

*Charts 759a, 597, 748a.*

*Chart 759a.*

route is very difficult, and care should be taken as the neighbourhood has not been closely examined ; although the discharge from rivers are often the cause of detached discoloured spots and, whereas banks and shoals in this vicinity rarely cause discoloration of the water, all such discoloration should be regarded as dangerous. Sounding and a good look-out from aloft are the best guides ; this route should only be taken by small vessels with local knowledge.

**Anchorage.**—There is anchorage about  $1\frac{1}{2}$  miles north-westward of Antraraka, in depths of from 7 to 8 fathoms ( $12^m8$  to  $14^m6$ ), sand and mud, with the single casuarina tree bearing  $163^\circ$ , and the clump of casuarina trees, north-eastward of the village,  $101^\circ$ .

The sea at this anchorage is sometimes high, but the holding ground is good. In good weather boats can steer for the flagstaff, at the south-western end of the village, which is visible from the anchorage, and leads across the sandbanks at high water.

There is also anchorage in depths of about 8 fathoms ( $14^m6$ ), with the single casuarina tree bearing  $225^\circ$ , and the clump of casuarina trees  $087^\circ$  ; this anchorage is dangerous during heavy westerly weather.

**Tidal streams.**—It is slack at low water, at the anchorages described above, and the flood stream, which sets east-north-eastward, attains a maximum rate of about three-quarters of a knot, one hour before high water ; the ebb stream attains a maximum rate of about a quarter of a knot at half tide, when it sets north-north-westward.

**Off-lying islets and dangers.**—Ankaramay shoal, 11 miles west-south-westward of Morondava, is described on page 234.

A rock, with a depth of less than 6 feet ( $1^m8$ ) over it, lies about 14 miles west-north-westward of Pointe Andriambé.

Southward of Cap Ankarana (*Lat.  $20^\circ 30' S.$ , Long.  $44^\circ 08' E.$* ) there are numerous islets and dangers, some of which lie as much as 10 miles offshore, and many others close to the coast ; about the latter so little is known, especially between the mouths of Rivière Kirindy and Rivière Lampaulo, as to render an inshore passage exceedingly dangerous.

Banc du Condé, with a depth of less than 6 feet ( $1^m8$ ) over it, lies about 13 miles westward of Pointe Andriambé.

One  $4\frac{1}{2}$ -fathom ( $7^m8$ ) and two  $4\frac{1}{2}$ -fathom ( $8^m7$ ) patches lie within about 5 miles southward of Banc du Condé.

A coral reef, over which the sea breaks heavily, lies about  $8\frac{1}{2}$  miles west-north-westward of the delta of Rivière Bélo ; it has two sandbanks, one at either end, which dry, the north-eastern one being the highest.

Bawden shoal, about 3 miles eastward of the southern part of this reef, was discovered, in 1883, by the *Osprey*, and has a least depth of  $1\frac{1}{2}$  fathoms ( $2^m3$ ) over it ; between Bawden shoal and the reef is a 4-fathom ( $7^m3$ ) patch ; a  $5\frac{1}{2}$ -fathom ( $10^m1$ ) patch lies about one mile south-eastward of Bawden shoal, and a 5-fathom ( $9^m1$ ) patch about  $2\frac{1}{2}$  miles southward of the same shoal.

Récif de l'Île de Sable (Sand Islet reef), lying about 4 miles southward of the coral reef described above, is 3 feet ( $0^m9$ ) high at its eastern extremity ; it is steep-to, except off its south-eastern point where there is a depth of 2 fathoms ( $3^m7$ ).

Nosy Andriangory, lying about 4 miles south-westward of Récif de l'Île de Sable, is composed of low sandhills, covered with stunted vegetation, amongst which are a few casuarina trees ; it is surrounded

*Chart 759a.*

by a reef which is steep-to, and which extends about 6 cables north-westward and 3 cables southward of it. A shoal, with a depth of  $5\frac{1}{4}$  fathoms (9<sup>m</sup>6) over it, lies about  $1\frac{1}{2}$  miles northward of Nosy

5 *Andriangory.*

Osprey shoal, with a depth of  $1\frac{1}{2}$  fathoms (2<sup>m</sup>7) over it, was discovered by a vessel of the same name, in 1883, and lies about  $5\frac{1}{2}$  miles eastward of Nosy Andriangory and 3 miles offshore; this shoal is probably one of many shoal heads lying on the coastal bank in this vicinity, rendering any approach to the coast between this shoal and

10 *Banc du Boursaint*, about  $7\frac{1}{4}$  miles south-south-westward, dangerous.

A 5-fathom (9<sup>m</sup>1) bank was discovered, in 1883, by the *Vaudreuil*, about 3 miles south-westward of Nosy Andriangory; the bottom was distinctly seen on both sides of the vessel.

15 *Nosy Bé*, a reef, the eastern part of which dries, lies about  $4\frac{1}{2}$  miles southward of Nosy Andriangory; a shoal, with a depth of  $3\frac{3}{4}$  fathoms (6<sup>m</sup>9) over it, lies about midway between Nosy Bé and Banc du Boursaint.20 *Banc du Boursaint*, about  $2\frac{1}{2}$  miles offshore, lies on the coastal bank and, on its eastern side, has three heads with depths of less than 6 feet (1<sup>m</sup>8) over them; there is no discoloration of the water over this reef, and it is steep-to on its western side.

A shoal, with a depth of  $4\frac{3}{4}$  fathoms (8<sup>m</sup>7) over it, and a reef, which dries, lie about 7 miles south-westward and southward, respectively,

25 of *Nosy Bé* (Lat. 20° 54' S., Long. 43° 46' E.).*Chart 2464.*

Nosy Andriamitaroka (Nosi Andrianmitarika), about 10 miles westward of the mouth of Rivière Maitampaka, is 9 feet (2<sup>m</sup>7) high, and lies on the eastern side of a coral reef which extends about three-quarters of a mile northward, half a mile westward, and  $1\frac{1}{2}$  miles southward of it; if approaching from eastward or westward two clumps of casuarina trees may be seen, of which the northern is the largest. This islet is one of the best landmarks for a vessel approaching Baie d'Ampasilava.

**Tidal streams.**—The tidal streams in the vicinity of Nosy Andriamitaroka attain a rate of half a knot, the flood stream setting south-eastward and the ebb stream westward.

*Chart 759a.*

**Anchorage.—Directions.**—There is anchorage about 4 cables eastward of Nosy Andriangory, in depths of 10 fathoms (18<sup>m</sup>3), sand and shells, moderate holding ground, with the northern extremity of the island bearing 270° and the southern extremity 232°. The islet only affords moderate shelter from heavy seas from westward and south-westward, on account of the small extent of its reef, and this anchorage should only be used in fine weather.

45 A vessel coming from seaward and wishing to use the anchorage described above should use the channel between Nosy Andriangory and Nosy Bé, or the channel northward of Nosy Andriamitaroka; the reefs surrounding these islets are nearly steep-to, and the islets are sufficient marks for the channels.

50 *Chart 2464.*

There is anchorage eastward of Nosy Andriamitaroka sheltered from westerly and south-westerly winds, which serves as a refuge for vessels forced to leave the anchorage in Baie d'Ampasilava. A vessel proceeding from this bay should steer a northerly course so as to pass

*Charts 759a, 597, 748a.*

*Chart 2464.*

2½ miles eastward of Nosy Andriamitaroka ; when a large tamarind tree, standing in the centre of the islet, is on a westerly bearing, a vessel can anchor about three-quarters of a mile offshore in depths of 9 fathoms (16<sup>m</sup>5), with the northern extremity of the islet bearing 280° and the southern extremity 254°.

**Baie d'Ampasilava.—Aspect.**—From Angoba the eastern side of Baie d'Ampasilava is high and wooded, with several groups of rocks scattered along the shore, and sandhills covered with tufts of vegetation, at the southern extremity of which the coast decreases in elevation and is fringed by a sandy beach.

Andranopasy (Ampasilava or Ranopasé), a village, in front of which stands a flagstaff, about 8½ miles south-westward of Angoba, is situated at the mouth of a river which is the north-easternmost branch of Rivière Mangoka ; the delta of this latter river extends nearly 40 miles westward and south-westward.

**Islets and dangers.**—Sandbanks, some of which dry, and the shapes of which are constantly changing, extend as far as 2 miles offshore from the delta of Rivière Mangoka.

Ile de l'Ouest (West islet), on which are two trees close together, lies on the western end of a sandbank, about 2½ miles west-north-westward of Andranopasy (*Lat. 21° 18' S., Long. 43° 45' E.*) ; Ile de l'Est (East islet), lying about midway between Ile de l'Ouest and Andranopasy and connected with the coast by a sandbank, has a few trees on it and some native huts.

A shoal, with a least depth of 3½ fathoms (5<sup>m</sup>9) over it, lies about 3 miles north-north-eastward of Ile de l'Ouest, and a 5-fathom (9<sup>m</sup>1) patch about one mile farther north-north-eastward ; a shoal, with a depth of 4½ fathoms (8<sup>m</sup>2), lies about 3 miles northward of this islet.

**Tidal streams.—Discoloured water.**—The flood stream sets eastward and the ebb stream north-westward, the former, which begins to run at half-tide, attaining its maximum rate of about three-quarters of a knot 1½ hours before high water ; the ebb stream, which begins to run at half-tide, attains its maximum rate of nearly half a knot at the time of low water.

During the ebb stream the muddy discharge from Rivière Mangoka often extends several miles offshore, giving the appearance of shoal water.

**Directions.—Anchorages.**—A vessel bound for an anchorage off Andranopasy should steer towards this village with the flagstaff bearing 158°, and anchor on this line, in depths of 5 fathoms (9<sup>m</sup>1), mud, good holding ground, with the double tree on Ile de l'Ouest bearing 215° ; the least depth in the approach is 4½ fathoms (7<sup>m</sup>8).

Small vessels can anchor closer inshore in depths of 20 feet (6<sup>m</sup>1), mud, good holding ground, with the flagstaff bearing 158° and the double tree 237°.

From these anchorages the bearing of the flagstaff given above will lead boats between the sandbanks to the shore.

During strong westerly winds vessels should anchor further offshore, on the same bearing of the flagstaff, in greater depths where the sea is less steep ; in such cases it would be more prudent to seek shelter in the anchorage eastward of Nosi Andriaomitarka.

**Coast. — Aspect. — Dangers.** — Between Pointe Marohata and Pointe Andefitra, 25½ miles south-south-westward, the coast is uniform

*Charts 759a, 597, 748a.*



*Chart 2464.*

in appearance and very low ; where the land is not marshy it is covered with palm trees.

Rivière Mangoka flows into the sea through several mouths ; as already stated, the estuary is encumbered with sandbanks, some of which dry, the low coast behind being covered with mangroves. Small craft with local knowledge can ascend some of the branches of this river.

Rivière Kitombo, the principal branch of Rivière Mangoka, flows into the sea about 9 miles northward of Pointe Andefitra ; a steamboat has ascended this river as far as Ankazohabo, a village about 17 miles above its mouth ; canoes can proceed about 150 miles farther up the river, but only between May and September.

Ambohibé, a village about 5 miles south-westward of Pointe Maro-hata, has been partially destroyed by inundations.

A shoal, with a depth of  $5\frac{1}{2}$  fathoms ( $10^m1$ ) over it, lies about  $6\frac{1}{2}$  miles westward of Ambohibé (*Lat.*  $21^{\circ} 20' S.$ , *Long.*  $43^{\circ} 31' E.$ ), but, as the bottom is rocky, there may be other shoals.

Fangoro, a village  $3\frac{1}{2}$  miles southward of Ambohibé, contains several houses ; a mission-house and a chapel, with red roofs, visible above the trees, make a good landmark.

Kitombo, an island, lies in the mouth of the river of the same name.

A bank, with depths of less than 10 fathoms ( $18^m3$ ) over it, extends as far as 11 miles offshore from the mouth of the Kitombo.

Antsira is a village about 4 miles southward of the southern entrance point of Rivière Kitombo.

A shoal, with a depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) over it, lies about  $1\frac{1}{2}$  miles offshore westward of Antsira, and a spit, with a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ) near its north-western edge, extends north-westward from the shore about 2 miles southward of Antsira.

Between Antsira and Pointe Andefitra the coast recedes slightly ; this bay is sheltered from south-westerly winds by the reefs extending about  $3\frac{1}{2}$  miles westward of Pointe Andefitra. Rivière Antseranandefitra (Antseranamahefitra), which flows into the south-western corner of this bay, is said to be a branch of the Mangoka.

Pointe Andefitra is a salient promontory, surmounted by high sand-hills with some small trees.

Nosy Andramona, lying about 3 miles westward of Pointe Andefitra, is a brownish-coloured islet, 27 feet ( $8^m2$ ) high, surrounded by a reef, and connected with the point by a bank of sand, rock, and coral, over which there is no passage except for boats at high water ; shoal water extends about one mile south-westward of this islet. Nosy Andramona is conspicuous from northward or southward at a distance of 10 miles, but from westward it appears to be part of the mainland.

**Off-lying dangers.**—Discoloured water has been reported about 15 miles westward of Ambohibé.

Banc Persépolis Nord and Banc Persépolis Sud, lying about 2 miles apart, were reported by the s.s. *Persépolis*, in 1904, to lie about 12 miles west-north-westward of the mouth of Rivière Kitombo ; the sea has been seen to break over these two banks, but the depths over them are not known.

**MOROMBÉ AND APPROACHES.**—**Aspect.**—**Beacons.**—Between Pointe Andefitra and Cap Tsingilofilo, about  $14\frac{1}{2}$  miles south-

*Charts 759a, 597, 748a.*

*Chart 2464.*

south-westward, is Baie de Tsingilofilo, and about halfway between these points is the town of Morombé.

A ridge of hills, 224 feet (68<sup>m</sup>3) high, from about one to 2 miles southward of Pointe Andefitra, can be identified by its whitish jagged cliffs, with black patches; it is conspicuous from westward. 5

Cap Morombé, close west-south-westward of the town, is composed of a sandhill, 14 feet (4<sup>m</sup>3) high, with a white beacon on its summit; a short distance inland is a ridge of hills, about 225 feet (68<sup>m</sup>6) high, sloping down to the cape, where the coast is low and wooded. 10

Southward of this cape (*Lat. 21° 46' S., Long. 43° 20' E.*) the coast is bordered with mangroves, and forms the eastern bank of the estuary of Baie de Befotaka or River St. Vincent, which flows into the sea close eastward of Cap Tsingilofilo; Cap Tsingilofilo is high and wooded.

A white warehouse, with a red roof, situated in Morombé is conspicuous; the Residency, the only stone building in the town, with a flagstaff in front of it, is situated about a quarter of a mile east-north-eastward of the cape. 15

A pair of leading beacons is situated about 4 miles south-south-westward of Pointe Andefitra; the beacons are constructed of wood, the front one standing on the coast and the rear one about 1½ miles south-eastward of the front one. These beacons do not show up well; they were reported, in 1945, to have disappeared. 20

Two beacons, each consisting of a masonry pyramid on a square base, 39 feet (11<sup>m</sup>9) in height, and painted white with a red horizontal band, are situated on Cap Morombé. The front beacon stands on the extremity of the cape, and the rear beacon stands about 3½ cables south-eastward of the front beacon; the rear beacon appears lower than the front beacon, by which it is hidden when they are in line. 25

**Islands and dangers.—Beacon.**—The approaches to Morombé are encumbered with islets and dangers. 30

Nosy Andramona, about 3 miles westward of Pointe Andefitra, is described on page 240.

Nosindolo, about 2½ miles south-westward of Nosy Andramona, is a group of two rocky islets, 3 and 2 feet (0<sup>m</sup>9 and 0<sup>m</sup>6) high, respectively, and a sandbank, which only covers at springs, lying on a reef, which extends about 3½ cables north-north-westward and westward and 6 cables southward of them; these islets, on account of their white colour, are visible from 4 or 5 miles seaward. A shallow bank, which surrounds this reef, extends about 3½ cables eastward of it; at the eastern edge of this bank is a rock, which dries 4 feet (1<sup>m</sup>2). 40

A coral shoal, with a depth of 4½ fathoms (8<sup>m</sup>7) over it, lies about 1½ miles north-westward, and a coral shoal, with a depth of 1½ fathoms (3<sup>m</sup>2), about 1½ miles westward, of Nosindolo.

Nosy Bé, about half a mile southward of the reef extending southward of Nosindolo, dries, and has on it some small black rocks; the highest of these rocks, lying near the north-eastern end of Nosy Bé, is one foot (0<sup>m</sup>3) high. A small black masonry tower, surmounted by a black cylinder, stands on the south-western edge of Nosy Bé. 45

A shoal, with a depth of 3½ fathoms (6<sup>m</sup>9) over it, is reported to lie about 6½ cables west-north-westward of Nosy Bé black masonry tower. 50

A reef, on which there are several islets and rocks, extends about 8½ miles northward of Cap Tsingilofilo. Nosy Lava, 43 feet (13<sup>m</sup>1) high, about 3 miles westward of Cap Morombé, is the northernmost,

*Chart 2464.*

and has a few trees on its summit ; a cairn, which was in a tumble-down condition, in 1945, stands on the northern part of Nosy Lava.

Nosy Trozona, a rocky islet, 3 feet (0<sup>m</sup>9) high, lies about 3 cables  
5 south-eastward of Nosy Lava.

Timpoy, an islet about 1½ miles southward of Nosy Trozona, has several trees on it ; a large rock, about one mile south-south-eastward of Timpoy (*Lat.* 21° 47' S., *Long.* 43° 17' E.), serves to mark the eastern edge of the reef extending northward of Cap Tsingilofilo.

10 Nosy Ratafany, 59 feet (18<sup>m</sup>0) high, lying about 2½ miles southward of Timpoy, is rocky and wooded ; close south-eastward of its southern extremity lies Ilot Ratafany, 125 feet (38<sup>m</sup>1) high. These islands are difficult to distinguish from seaward.

A reef, which is scarcely visible, the northern extremity of which lies  
15 about 3½ miles west-south-westward of Nosy Lava, extends about three-quarters of a mile south-westward ; the sea only breaks over it at intervals.

Morrison reef, which dries, lies about 2½ miles southward of the reef just described ; the sea breaks over it when it is at all rough. A spit,  
20 with a least depth of 5½ fathoms (10<sup>m</sup>1) over it, extends about one mile south-south-westward of Morrison reef.

**Channels.**—Three channels lead through the reefs towards Morombé, and are known as Passe du Nord, Passe du Milieu, and Passe du Sud.

Passe du Nord, between Nosy Andramona and Nosindolo, though  
25 wide, is narrowed by the shoal water extending from the reefs on either side of the channel.

Passe du Milieu, between Nosindolo and Nosy Bé, is narrow, and is difficult on account of there being no marks, and of the shoal, with a depth of 1½ fathoms (3<sup>m</sup>2), 1½ miles westward of Nosindolo.

30 Passe du Sud, between Nosy Bé and Nosy Lava, is the safest and most used channel ; it is narrow, with moderate depths. It is well marked by the leading beacons on Cap Morombé and the beacon on the south-western edge of Nosy Bé.

**Tidal streams.**—The tidal streams are strong, especially in Passe  
35 du Sud, the ebb stream setting northward, varying one or two points from the leading line, until half-tide, when it sets southward ; the flood stream, which is not as strong as the ebb stream, has the same alternations as the ebb stream, but is not so regular.

In the channels leading to Morombé it is slack water at the times of  
40 high and low water.

At the anchorage off Cap Morombé, at springs, the flood stream has been observed to set south-south-westward, attaining a maximum rate of about 1½ knots one hour before high water, and the ebb stream to set east-north-eastward, attaining a maximum rate of about 1½ knots  
45 2 hours before low water.

**Directions.**—The approaches to Morombé are difficult on account of the lack of landmarks, and the existence of off-lying dangers ; the islands are difficult to distinguish from seaward, but Nosy Lava, although it does not appear to stand out clear of the mainland may be  
50 identified by the cairn standing on its northern part. The beacons on Cap Morombé are generally visible from the offing, and can be identified in sufficient time to avoid the off-lying dangers.

Approaching from northward the high sandhills of Pointe Andefitra are first sighted, and then the beacons on Cap Morombé. If a vessel's

*Chart 2464.*

draught allows of her using Passe du Nord she must bring the beacons (*Lat. 21° 44' S., Long. 43° 24' E.*) 4 miles south-south-westward of Pointe Andefitra in line, bearing 129°, which leads through the fairway of this channel; when the front beacon on Cap Morombé bears 186½°, it should be steered for on that bearing, which leads towards the anchorage. The passage across the shallow flat which connects Nosy Bé with the coast should only be used by small vessels with local knowledge. 5

If using Passe du Sud a vessel must keep well westward of the off-lying dangers until the beacons on Cap Morombé are in line, bearing 133°, when they should be steered for on this bearing, which leads through the fairway of Passe du Sud, passing close south-westward of the shoal, with a depth of 3½ fathoms (6<sup>m</sup>9) 6½ cables west-north-westward of Nosy Bé black masonry tower, until the black masonry tower on the south-western edge of Nosy Bé bears 345°; thence a vessel should alter course south-south-eastward, keeping this tower, astern, bearing 345°, which leads to an anchorage west-north-westward of Cap Morombé. 10 15

A vessel approaching from southward should pass westward of Morrison reef and the reef northward of it, which must be specially guarded against as they are not always marked by breakers. The beacons on Cap Morombé should be brought in line, bearing 133°, while north-westward of Nosy Lava, so as to avoid the shoal, with a depth of 1½ fathoms (3<sup>m</sup>2), 1½ miles westward of Nosindolo; these beacons should then be steered for, and a vessel should proceed as directed above. 20 25

**Anchorage.—Directions.—Buoy.**—There are two anchorages in the vicinity of Morombé, within the off-lying islands and dangers; they are well sheltered, with good holding ground. South-westerly winds are often strong here during the afternoon, and cause a choppy sea. 30

The anchorage westward of Cap Morombé is the only anchorage which is accessible at all states of the tide to vessels drawing more than 26 feet (7<sup>m</sup>9). Anchorage can be obtained with the black masonry tower on the south-western edge of Nosy Bé bearing 345°, and, on a line joining Nosy Trozona and the front beacon on Cap Morombé, with Nosy Trozona bearing about 280° and the front beacon about 100°; vessels should not anchor southward of the parallel of the cape, so as to avoid the shoal water. 35

The town anchorage, north-westward of the Residency, is accessible only on the flood tide. To approach this anchorage in a least depth of 16 feet (4<sup>m</sup>9) a vessel should steer with the masonry tower on Nosy Bé reef, bearing 345°, astern, until Nosy Trozona is in line with the southern extremity of Nosy Lava, bearing 275°, when course should be altered for the one-storied building of the Norwegian mission, with its red roof, just open northward of the Residency, bearing about 095°, which leads about half a mile southward of a shoal with a least depth of 1½ fathoms (2<sup>m</sup>7) over it, lying about one mile north-westward of Cap Morombé, and the southern extremity of which is marked by a black buoy, surmounted by a cylinder; the position of this buoy must not be relied upon. When Pointe Andefitra (*Lat. 21° 40' S., Long. 43° 25' E.*) bears 044°, a vessel should steer on this line and anchor, in depths of 5 fathoms (9<sup>m</sup>1), when the Residency bears 133°. 40 45 50

Communication with the shore is by means of native boats.

*Charts 759a, 597, 748a.*

*Chart 2464.*

**Port limits.**—The limits of the port are as follows:—

From a position  $224^{\circ}$  distant  $10\frac{1}{2}$  cables from the beacon on Cap Morombé, a line drawn in a  $270^{\circ}$  direction for a distance of 8 cables, 5 thence in an  $000^{\circ}$  direction for 21 cables, thence in an  $090^{\circ}$  direction for 18 cables, and thence in a  $156^{\circ}$  direction to the high water line.

**Town.**—Morombé is built on the coast north-eastward of Cap Morombé. It is the chief town of the district and the residence of an Administrator.

10 There is regular steamer communication with the other Madagascan ports. Morombé is connected with the general telegraph system.

**Signal station.**—**Storm signals.**—There is a signal station at Morombé.

Signals indicating the locality threatened by a cyclone, *see* page 27, 15 are displayed.

**COAST.**—**Aspect.**—**Dangers.**—The coastal area between Cap Tsingilofilo and Baie de Fanemotra, about 20 miles southward, is known locally as Cap St. Vincent; the coast is fringed, in places, by a coral reef, which extends as much as  $1\frac{1}{2}$  miles offshore.

20 Nosy Bevato, of which Cap Tsingilofilo is the northern extremity, is a wooded peninsula, lying between two branches of a large river; Cap Bevato, its western extremity, about  $2\frac{1}{2}$  miles south-south-westward of Cap Tsingilofilo, is formed by two rocks, 59 feet ( $18^m0$ ) high; Cap Itséré, about 3 miles south-south-westward of Cap Bevato, 25 can be identified by two clearly defined sandhills, about one mile apart, the northern one, 39 feet ( $11^m9$ ) high, being pointed. Neither Cap Bevato nor Cap Itséré show up well from the offing.

A reef, the northern extremity of which is situated about  $2\frac{1}{2}$  miles south-south-westward of Cap Itséré, extends about  $2\frac{1}{2}$  miles south- 30 south-westward, and lies about half a mile offshore; two islets, Nosy Bemoka and Andamotibe, lie at the northern and southern ends, respectively, of this reef, and there are several rocks, above water, near the edges of the reef.

Pointe Andavaloaka, about 7 miles south-south-westward of Cap 35 Itséré, is easily identified by a large black perforated rock lying at the western edge of a reef extending about a quarter of a mile westward of this point; within this rock is a sandy creek at the head of which stands the village of Andavaloaka.

Other landmarks in this vicinity are a cairn, situated on the summit 40 of a hill about  $1\frac{1}{2}$  miles northward of Andavaloaka, and a casuarina tree, conspicuous from the offing, standing near the coast, about a quarter of a mile south-eastward of this village.

About one mile southward of Pointe Andavaloaka is Pointe Antsérnanambé, which is rocky; from this point a sandy beach, 45 bordered by casuarina trees, trends about  $1\frac{1}{2}$  miles south-south-eastward to the village of Ampasilavadambao (*Lat.*  $22^{\circ} 07' S.$ , *Long.*  $43^{\circ} 14' E.$ ), thence the coast again becomes rocky, backed by wooded hillocks, as far as Pointe Lamboharana, the northern entrance point of Baie de Fanemotra.

50 Pointe Lamboharana, 61 feet ( $18^m6$ ) high, has a conspicuous small peak at its southern extremity.

**Off-lying islands and dangers.**—Récif Rogier extends about 5 miles southward from a position about  $2\frac{1}{2}$  miles westward of Cap

*Charts 759a, 760, 597, 748a.*

*Chart 2464.*

Tsingilofilo; the sea breaks over this reef, except on its middle part. It is separated from the coastal reef by a narrow winding channel, which is only accessible to small vessels with local knowledge.

Nosy Andrahombava, 22 feet (6<sup>m</sup>7) high, lies about 1½ miles west-south-westward of the southern end of Récif Rogier, from which it is separated by a navigable channel with moderate depths; it is formed of sandhills covered by euphorbia bushes, with a few clumps of casuarina trees, and makes a good landmark. This islet is not inhabited, but fishermen's canoes sometimes seek shelter here. A reef extends about half a mile north-north-westward and 1½ miles southward of Nosy Andrahombava. 5 10

The north-westerly swell meets the southerly swell off the north-eastern point of this islet, producing a relative calm which makes landing easy on this coast. 15

Parsons reef lies about three-quarters of a mile southward of the reef mentioned above; a sandbank, above water, lies on the eastern side of Parsons reef.

The channel northward of Parsons reef is not considered safe; a shoal, with a depth of 5 fathoms (9<sup>m</sup>1) over it, lies about a quarter of a mile northward of Parsons reef. 20

Nosy Fasy, a reef lying about 2½ miles southward of Parsons reef and 2 miles offshore, has on its eastern side a sandbank which dries about 4 feet (1<sup>m</sup>2).

Nosy Hao, 13 feet (4<sup>m</sup>0) high, lying about half a mile southward of Nosy Fasy, is composed of sand dunes thickly covered with bushes; this islet does not stand out clearly when viewed against the coast. A reef extends about 1½ miles southward and three-quarters of a mile westward of this islet. 25

A shoal, with a depth of 3½ fathoms (6<sup>m</sup>9) over it, lies in mid-channel between Nosy Fasy and Nosy Hao. 30

Dos de Baleine (Whales Back), lying about 5½ miles southward of Nosy Hao, is a detached rock, which dries; the sea breaks very occasionally over this rock in calm weather.

**Tidal streams.**—The flood tidal stream eastward of Nosy Hao sets north-north-westward at a rate of about a quarter of a knot and the ebb stream south-south-eastward at a rate of about half a knot. 35

**Directions.—Anchorages.**—A vessel approaching Cap St. Vincent (page 244) from seaward will, in clear weather, see in the interior a range of mountains divided by a large opening with perpendicular sides. A course should be steered for the opening until the islands are identified; the trees on Nosy Andrahombava will prevent it being mistaken for Nosy Hao, which is only covered with bushes. 40

The landmarks on the coast in this vicinity are described on page 244.

There is anchorage eastward of Nosy Andrahombava (*Lat.* 21° 58' S., *Long.* 43° 11' E.), about 3 cables offshore, in depths of 9 fathoms (16<sup>m</sup>5), sand and shells, good holding ground, with the northern extremity of this islet bearing 294° and the southern extremity 243°; it is well sheltered from the westerly swell. Landing can be effected on Nosy Andrahombava from this anchorage. 45 50

A vessel approaching this anchorage should pass between Récif Rogier and Nosy Andrahombava; she can also pass southward of Parsons reef. These channels can only be used by day.

Anchorage can be obtained about 6 cables eastward of Nosy Hao, in

*Chart 2464.*

depths of from  $6\frac{1}{2}$  to 8 fathoms ( $11^m9$  to  $14^m6$ ), fine sand and shells, good holding ground, with the northern extremity of the island bearing  $325^\circ$  and the southern extremity  $245^\circ$ . Landing on the island can be effected from this anchorage. The anchorage is sheltered from the westerly swell, but is exposed southward, and the sea from that direction is often heavy; in such circumstances the anchorage off Nosy Andrahombava is preferable.

The anchorage off Nosy Hao can be approached, by a vessel coming from northward, between Récif Rogier and Nosy Andrahombava, and thence she should steer southward towards the anchorage; the reefs on either side are steep-to. A vessel coming from southward usually proceeds along the coast; the channels between the islets, described on pages 244–245, are not recommended.

**Baie de Fanemotra.—Dangers.**—Baie de Fanemotra is entered between Pointe Lamboharana and Pointe Antsomotra, about three-quarters of a mile south-south-eastward, both of which points are fringed by reefs.

Pointe Lamboharana is the south-western extremity of an island, separated from the coast by a narrow boat channel; about the middle of the north-eastern side of this island is a village of the same name, and about three-quarters of a mile south-south-eastward of Lamboharana there is a village, called Andembodemboka.

Pointe Antsomotra consists of a white cliff, and about  $1\frac{1}{2}$  miles south-south-westward is Pointe Mananonoka, consisting of some bare hills higher than Pointe Antsomotra; a reef, known as Vatomandéfoka, over which the sea breaks heavily, extends about  $2\frac{1}{4}$  miles north-westward of Pointe Mananonoka.

Dos de Baleine, about  $2\frac{1}{2}$  miles westward of Pointe Lamboharana, is described on page 245.

Baie de Fanemotra is encumbered with shoals.

**Directions.—Anchorage.**—This bay should only be entered by small vessels with local knowledge. A vessel entering it should keep in the middle of the entrance channel, steering for the head of the bay; after passing through the entrance channel she should bear northward, and anchor about 3 cables eastward of the northern entrance point. It is usually calm at this anchorage.

*Chart 760.*

**Coast. — Aspect. — Dangers.** — From Pointe Mananonoka to the entrance to Rivière Manombo, about 45 miles south-south-eastward, there is no anchorage; as far as Mamirano (*Lat.*  $22^\circ 25' S.$ , *Long.*  $43^\circ 17' E.$ ), about 10 miles south-south-eastward of the former, the coast is composed of jagged and arid sandhills, which are visible from some distance seaward; thence the coast becomes rocky, and is fronted by several rocks, which lie close offshore. Among the mountains of the interior rises a peak, higher than the rest, which serves to identify the anchorage at Manombo, and that at Baie de Ranobé, about 8 miles farther south-south-eastward.

Pointe Tala (Tata point), about 5 miles southward of Pointe Mananonoka, is low, rocky, and of a blackish colour.

From Pointe Tala the coast is fringed, with but little intermission, as far as Baie de St. Augustin, about 75 miles south-south-eastward, by a barrier reef, which extends as much as 3 miles offshore. This barrier reef is steep-to seaward and vessels may approach within a mile

*Charts 760, 597, 748a.*

*Chart 760.*

of it ; there are several gaps in it through which small craft with local knowledge may pass and navigate inside the reef. The sea breaks over it for almost its entire length, but between Mamirano and Salara, about 8 miles southward, the breakers cease ; the shoals, however, show up 5 green for some distance offshore.

This part of the coast is backed by jagged barren sandhills which can be seen from a great distance.

The mouth of Rivière Manombo is difficult to distinguish, and can only be identified by the more luxuriant vegetation there ; the mouth 10 is almost always dry, and can be forded at nearly all states of the tide.

A village of the same name is situated on the western side of the entrance to this river, and is visible from some distance seaward ; there is a conspicuous chapel, with a pointed roof, about half a mile northward. On Ambohibé, a hill north-eastward of the river mouth, 15 overlooking Manombo, is a flagstaff which serves as a landmark.

Tony, a village about one mile east-south-eastward of the mouth of Rivière Manombo, consists of two groups of huts ; the customs flagstaff stands in the northern group.

Southward of the mouth of Rivière Manombo the coast is composed 20 of a sandy beach, backed by low hills, covered with scanty vegetation ; further inland is a range of fairly high mountains, with flat summits, sloping towards the coast at Baie de Ranobé and Tuléar (Tullear), about 14 miles south-south-eastward of Baie de Ranobé.

Pointe Tony, about 3 miles south-south-eastward of Tony, is the 25 north-western entrance point of Baie de Ranobé ; it may be identified by a conspicuous hill, with sharply defined steps, showing above the trees, situated about a mile northward of the point.

From Pointe Tony the coast trends about 10 miles south-eastward forming Baie de Ranobé, within the barrier reef ; the first 4 miles of 30 this stretch of coast is fringed with mangroves, thence the coast is backed by several wooded hills, which slope steeply to the coast, where there are rocky points, with sandy beaches between them. Some conspicuous casuarina trees stand on a rectangular-shaped hill backing the south-eastern entrance point (*Lat. 23° 07' S., Long. 35 43° 35' E.*) of the bay.

Baie de Ranobé is encumbered with several coral heads which, at high water, can easily be distinguished on account of the discoloration of the water.

*Charts 692, 760.*

40

From the south-eastern entrance point of Baie de Ranobé the coast trends about 5 miles southward to Andohatanga, thence about 9 miles further southward to the mouth of Rivière Fihérénana ; the coast is sandy, and is backed by low hills with scanty vegetation.

The valley of Rivière Fihérénana is easily identified by a gap in the 45 hills.

*Chart 692.*

The delta of the river is subject to great changes ; some of the former arms of the river are now only marshes, which are usually covered with mangroves, forming islets, principally on the southern bank of the 50 delta. The delta terminates in Pointe Anosy, a low-lying point about one mile south-south-eastward of the southern entrance point of the river ; it is fringed by a shallow bank, which extends some distance offshore, and is marked by a dirty yellow discoloration.

*Charts 760, 597, 748a.*



*Chart 760.***Anchorage. — Directions. — Beacon. — Tidal streams. —**

There is a fine weather anchorage off the mouth of Rivière Manombo in depths of from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  fathoms ( $6^m9$  to  $8^m7$ ), sand, with sufficiently good holding ground.

The *Surprise*, between 1923 and 1934, anchored with the chapel (page 247), half a mile northward of the mouth of the river, bearing  $004^\circ$ , and the Custom house  $101^\circ$ .

The reefs northward and southward of the entrance afford some shelter to this anchorage. Boats can land on the beach in front of Tony, except within three-quarters of an hour of low water, taking care to avoid the sandy beach off the village.

Passe Fanandomotra, an opening in the barrier reef, about 7 miles south-south-eastward of Pointe Tony, has a navigable width of about 2 cables, with a least depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) in the fairway; this pass is only safe in fine weather, on account of the strong tidal streams, and the sea which, in bad weather, makes it impossible to distinguish the lines of breakers marking the reefs. It should only be used by small vessels with local knowledge.

The depths decrease rapidly at the entrance to Passe Fanandomotra.

A pole beacon, 59 feet ( $18^m0$ ) in height, surmounted by a white T, has been erected at Baie de Ranobé as the front mark for the leading line through Passe Fanandomotra, but its exact position is not known; the rear mark is the fall of a hill at Manombo, which is not always visible. These marks, when in line, bear  $040\frac{1}{2}^\circ$ .

The best time for entering this pass, having regard to the position of the sun for seeing the reefs, is about an hour before low water, and for leaving, about high water.

Passe Maroazo, or Fausse passe, about 4 miles south-south-eastward of Passe Fanandomotra (*Lat.  $23^\circ 07' S.$ , Long.  $43^\circ 30' E.$* ), is a boat channel leading into a small space free from dangers, but there is no connection with the anchorage in Baie de Ranobé. Care must be taken not to mistake Passe Maroazo for Passe Fanandomotra.

The tidal streams are strong in Passe Fanandomotra, with strong eddies, but are weak within Baie de Ranobé; the rate does not exceed about three-quarters of a knot. The flood stream sets northward, and attains its maximum rate at half-tide, when it starts to decrease, but runs until an hour after high water. The ebb stream also attains its maximum rate at half-tide and sets southward, ceasing at low water.

Baie de Ranobé affords the best anchorage on this part of the coast for small vessels with local knowledge. A vessel having passed through Passe Fanandomotra, as previously directed, should bring the hill about one mile northward of Pointe Tony to bear  $344^\circ$ , and steer for it on that bearing, anchoring in depths of from  $3\frac{1}{2}$  to  $4\frac{1}{2}$  fathoms ( $6^m9$  to  $8^m7$ ), sand, taking care to avoid the coral heads.

*Chart 692.*

**RADE DE TULÉAR AND BAIE DE ST. AUGUSTIN.**—Rade de Tuléar.—Rade de Tuléar, on the southern side of the delta of the Fihérénana, lies between the coast and the northern part of Grand Récif (Great Reef), about one mile offshore.

**Coast.—Landmarks.—Beacon.**—The delta of the Fihérénana, with the surrounding high land, forms a good landmark; the light-structure on Pointe Anosy, with a white square hut close north-

*Charts 760, 597, 748a.*

*Chart 692.*

westward of it, is the most conspicuous mark from seaward. The town of Tuléar, on the eastern side of the delta, with the surrounding vegetation, also the radio masts, eastward of the town, can be seen from a distance. 5

Mahavatsy beacon, a masonry pyramid, 46 feet (14<sup>m</sup>0) in height, painted in black and white horizontal bands, and surmounted by a white cylinder, is situated about 1½ miles east-south-eastward of Pointe Anosy.

From Pointe Mahavatsy, about 1½ miles east-south-eastward of 10 Pointe Anosy, the coast trends about 1½ miles south-eastward to Pointe Befotaka, where it recedes about half a mile in a north-north-easterly direction, and thence trends about 2½ miles south-south-eastward to Pointe Kilibé; here the coast recedes, forming a bight, and the hills of the interior approach the coast, reaching it about 15 5 miles south-south-eastward of Pointe Kilibé.

This part of the coast, which is bordered with mangroves, consists of a line of sandhills, sloping steeply to the coast; within Pointe Befotaka is a small sandy beach where landing is easy.

Mahinia or Table hill, 538 feet (164<sup>m</sup>0) high, although lower than the 20 ranges of the interior, stands out clearly, its summit consisting of a long horizontal plateau, with a small hummock at each end, but from westward only the plateau can be seen; from southward Mahinia hill shows two summits, but it is not easily identified.

Ny Andréa, a peninsula, 193 feet (58<sup>m</sup>8) high, which terminates in 25 Barn Hill point (*Lat.* 23° 33' S., *Long.* 43° 44' E.), about 7½ miles southward of Pointe Kilibé, consists of whitish limestone; it is conspicuous from seaward when the sun is shining on it.

From the northern end of Ny Andréa a sandy peninsula, flat at its root, but terminating northward in sandhills, extends about 1½ miles 30 north-north-westward to Pointe Sarodrano, on the north-western side of which is a village of the same name; the western side of this peninsula is fringed by a reef, which dries, 3 feet (0<sup>m</sup>9), and extends as much as half a mile offshore.

**Off-lying reef.—Buoy.—Beacons.**—Grand Récif, the northern 35 extremity of which is situated about 1½ miles west-north-westward of Pointe Anosy and one mile offshore, extends, parallel to the coast, for a distance of about 10 miles; this reef dries. Between it and the coastal reef is a winding channel, which affords excellent shelter, and where vessels may lie in complete security. 40

A red conical buoy is moored about 2 cables north-eastward of the north-eastern extremity of Grand Récif.

Beacon C stands on the north-eastern side of Grand Récif, about 2½ miles from its northern extremity and one mile north-westward of Pointe du Serpent, and consists of a square panel, painted in red and 45 white chequers; Beacon D, about half a mile south-eastward of Beacon C, consists of a square panel, the upper half painted white and the lower half a faded red, on a sand-coloured masonry base.

A beacon, surmounted by a cylinder, stands on the eastern side of Grand Récif, about 3 cables from its south-eastern extremity. 50

**Lights.**—A light is exhibited from a small framework structure, surmounting a square stone pyramid, 59 feet (18<sup>m</sup>0) in height, painted in black and white horizontal bands, situated on Pointe Anosy.

A light is exhibited from a post, 10 feet (3<sup>m</sup>0) in height, situated at

*Chart 692.*

the head of the jetty at Tuléar, about  $1\frac{1}{2}$  miles east-south-eastward of Pointe Anosy light.

**Dangers.—Beacons.—Buoys.**—Several detached patches, with a least depth of 2 fathoms ( $3^m7$ ) over them, lie in the channel between Grand Récif and the coastal reef; the positions of these patches can best be seen on the chart.

Beacon E, consisting of a post on a square masonry base, surmounted by a black cylinder, is situated on the coastal reef about 4 cables westward of Mahavatsy beacon.

Banc de Mahavatsy is the name given to a narrow spit, with a least depth of 2 fathoms ( $3^m7$ ) over it, extending south-eastward from the edge of the coastal reef to a position about  $1\frac{1}{2}$  miles south-eastward of Pointe Anosy; it is marked on its north-eastern side by three black truncated conical buoys, each surmounted by a black cylinder, and one red truncated conical buoy, surmounted by a red cone.

Banc Mareana, which dries, extends about  $1\frac{1}{2}$  miles offshore, between Pointe Befotaka and Pointe Kilibé; a beacon, surmounted by a cone, is situated on the north-western side of this bank.

A conical buoy is situated on the south-western side of the fairway, about 2 miles south-south-eastward of Banc Mareana beacon (*Lat.*  $23^\circ 24'$  S., *Long.*  $43^\circ 40'$  E.) and half a mile from Pointe Angèle, a point about  $2\frac{1}{2}$  miles south-south-eastward of Pointe du Serpent.

Rocher Microbe, about  $2\frac{1}{2}$  miles north-westward of Pointe Sarodrano, dries 2 feet ( $0^m6$ ); it lies at the south-western edge of a shoal, which has a least depth of three-quarters of a fathom ( $1^m4$ ) over it, and is marked on its south-western side by a cylindrical buoy.

Nosy Tafara, a detached reef, which dries 2 feet ( $0^m6$ ), lies about  $1\frac{1}{2}$  miles south-south-eastward of Rocher Microbe and three-quarters of a mile offshore.

*Charts 692, 760.*

**Channels.—Directions.**—Passe du Nord, which lies between the north-eastern end of Grand Récif and the delta of the Fihérénana, is about half a mile wide, with a least depth of 7 fathoms ( $12^m8$ ), mud, in the fairway. It is difficult to distinguish in bad weather, and care must be taken not to confuse it with the opening in the coastal reef farther northward; it is advisable, therefore, to identify Grand Récif, on the parallel of Mahinia hill, and then proceed northward until the entrance to the channel is distinguished.

*Chart 692.*

Vessels are recommended to approach Passe du Nord in the morning; in the afternoon south-westerly winds cause sandstorms, and Mahinia hill is then not visible. In calm weather there is often a slight mist over the reefs, which makes it difficult to identify them at night.

A vessel approaching the entrance should steer with Pointe Anosy light-structure, Mahavatsy beacon, and Mahinia hill, in line, bearing  $112^\circ$ , which leads through the fairway of Passe du Nord, until Beacons C and D are in line, bearing  $147^\circ$ ; a conspicuous round hummock can be seen on this latter alignment, situated behind the sandhills at Sarodrano.

A vessel should now alter course south-eastward, keeping Beacons C and D in line, until Beacon E is in line with Mahavatsy beacon, bearing  $088^\circ$ , when course can be altered eastward towards the anchorage.

Passe du Sud (South or Sarodrano pass), between the southern

*Charts 760, 597, 748a.*

*Chart 692.*

extremity of Grand Récif and Nosy Tafara, has a navigable width of about 2 cables, with a least depth of 7 fathoms ( $12^m8$ ) in the fairway; Mahinia hill, bearing  $038^\circ$ , leads through this channel, passing close north-westward of a shoal, with a least depth of  $4\frac{1}{2}$  fathoms ( $8^m7$ ) over it, lying about  $3\frac{1}{2}$  cables westward of Nosy Tafara. 5

When Pointe Sarodrano bears  $100^\circ$  course should be altered to  $357^\circ$ , which leads between Grand Récif and Rocher Microbe; the recommended track thence northward is indicated by pecked lines on the chart; a least depth of 13 feet ( $4^m0$ ) can be carried but, owing to the large number of shoals and the absence of marks, it should only be attempted by small vessels with local knowledge. 10

**Caution.**—As a general rule it is better for a vessel entering Rade de Tuléar (*Lat.  $23^\circ 22'$  S., Long.  $43^\circ 38'$  E.*) to do so at low water as the banks and reefs dry. Careful attention should be paid to the changes in colour of the water, and to avoid having the sun ahead; sounding is the best guide, as muddy water flows into the channel from the rivers. 15

**Tidal streams.**—The ingoing tidal stream sets south-eastward. During the dry season, at ordinary spring tides, the flood stream sets through Passe du Nord, the channel northward of Grand Récif, thence south-eastward towards Passe du Sud, the channel southward of that reef, whence it sets in the opposite direction towards Passe du Nord, up to westward of Pointe Kilibé; the same phenomenon occurs in the reverse order with the ebb stream. This general set is influenced by 25 traverse components which vary with the position in the channel and the state of the tide.

The tidal streams are strongest off the northern end of Grand Récif where, at springs, they attain a rate of 2 knots.

**Pilotage.**—Pilotage is not compulsory. The Port officer will indicate the anchorage to incoming vessels; the pilot vessel, displaying the pilot flag at the fore and the French ensign aft, will wait at the indicated anchorage, and signal when the anchor should be let go. The Port officer will board incoming vessels which require a pilot near the entrance to Passe du Nord. 35

**Anchorage. — Directions. — Tidal streams.**—The anchorage in Rade de Tuléar is well protected and safe at all seasons; it has depths of from  $3\frac{1}{2}$  to 8 fathoms ( $5^m9$  to  $14^m6$ ), soft mud, throughout its length, and an available width of nearly a mile between the reefs in most parts. 40

Anchorage can be obtained in depths of 7 fathoms ( $12^m8$ ), with Beacon E in line with Mahavatsy beacon, bearing about  $088^\circ$ , and the protestant church, which is situated about one mile north-north-westward of Mahavatsy beacon, bearing  $053^\circ$ .

There is good holding ground in depths of from  $5\frac{1}{2}$  to  $6\frac{1}{2}$  fathoms ( $10^m1$  to  $11^m9$ ), with the Residency flagstaff, which is situated  $3\frac{1}{2}$  cables southward of the protestant church, bearing  $053^\circ$ . 45

Vessels must not anchor northward of the line of the transit of Beacon E and Mahavatsy beacon.

Vessels can obtain anchorage a little farther southward in a sector formed by Beacon E in line with Mahavatsy beacon, on the northern side, and the eastern radio mast, bearing  $043^\circ$ , on the southern side, in depths of from 6 to  $6\frac{1}{2}$  fathoms ( $11^m0$  to  $11^m9$ ), mud, but care must be taken to avoid Banc de Mahavatsy. 50

*Charts 760, 597, 748a.*

*Chart 692.*

In 1938, the s.s. *City of Christiania* anchored, in a depth of 7 fathoms (12<sup>m</sup>8), with Pointe Anosy light-structure bearing 329°, distant 16½ cables.

- 5 Small vessels with local knowledge, with a draught not exceeding 16 feet (4<sup>m</sup>9), can obtain anchorage closer in, with swinging room of 1½ cables, on the eastern side of Banc de Mahavatsy, in depths of from 3½ to 3¾ fathoms (5<sup>m</sup>9 to 6<sup>m</sup>9). A vessel making this anchorage should pass between the red buoy and the centre black buoy, marking  
10 the north-eastern side of Banc de Mahavatsy, and anchor with Beacon E in line with the eastern radio mast, bearing 043°, and Pointe Anosy light-structure (*Lat. 23° 21' N., Long. 43° 38' E.*), bearing 318°, in depths of 3¾ fathoms (6<sup>m</sup>9), sand and mud, good holding ground.

In the afternoon, a choppy sea is often experienced at these  
15 anchorages.

The tidal streams at the anchorages are not felt as much as those described on page 251; they attain a rate of about 1½ knots at springs. The maximum rate of the tidal streams is experienced about 1½ hours before and after the change of the tide.

- 20 **Piers.**—A stone jetty projects from the coast about one cable southward of the Residency flagstaff. In 1942, it was reported that, owing to the silt brought down by the Fihérénana, the low water line had receded three-quarters of a cable south-westward of the jetty, which was then disused.

- 25 A pier, with an L-shaped wharf at its head, alongside which vessels can lie, has been constructed in the vicinity of Mahavatsy beacon; this wharf is 197 feet (60<sup>m</sup>0) long and was reported, in 1943, to have a depth of 21 feet (6<sup>m</sup>4) alongside; there are two mooring posts on the wharf, and vessels must be prepared to use their own boats when securing  
30 alongside. There is a steam crane on the northern end of the wharf which can lift about 5 tons; there is a light railway along the pier.

A vessel proceeding from the roadstead to the wharf can either pass between the red buoy and the centre black buoy, marking the north-eastern side of Banc de Mahavatsy, as directed above, or southward  
35 of the southernmost black buoy.

**Port limits.**—The limits of the port are as follows:—

On the north: a line drawn in a 273° direction from the light-structure on Pointe Anosy to Grand Récif.

- On the south: a line drawn in a 218° direction from Pointe Mahavatsy  
40 to Beacon D on Grand Récif.

**Tuléar.**—The town of Tuléar, the chief town of the province, stands on low sandy ground, slightly wooded; it had a population, in 1943, of 16,560.

- The pointed spire of the protestant church, which is of a reddish  
45 colour, and is surmounted by a globe, is conspicuous. Other conspicuous marks are the Residency, the highest building in the town, surrounded by a verandah, with a flagstaff close southward of it; the signal station, which is situated behind the Custom house, about 2 cables south-south-eastward of the Residency, and the radio masts, eastward  
50 of the town, already mentioned.

**Communications.**—There is regular steamer communication with the other Madagascan ports, also with Durban.

Tuléar is connected with the general telegraph system.

There is a radio station here; see page 26.

*Charts 760, 597, 748a.*

*Chart 692.*

**Port facilities.**—Beef, of good quality, is plentiful, and fish, poultry, eggs, and fruit are obtainable. Water is laid on to the wharf, but it should be boiled before drinking.

There is a small hospital.

Tugs and lighters are available.

**Signal station.**—**Storm signals.**—There is a signal station at Tuléar (*Lat. 23° 22' S., Long. 43° 39' E.*).

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed.

**Winds.**—South-westerly winds prevail all the year round which, freshening during the afternoon, render landing difficult, as at most places on this coast.

**Meteorological tables.**—*See* page 57.

**Baie de St. Augustin.**—**Aspect.**—**Dangers.**—Baie de St. Augustin is entered between Pointe Sarodrano and the coast, about 6 miles south-south-westward; Rivière Onilahy (St. Augustine or Onilahé river) flows into the head of this bay. The depths in the bay are great, except close offshore.

The village of Saolara, standing on the southern shore of the bay, about 2½ miles west-south-westward of Ampasimanoro, the southern entrance point of Rivière Onilahy, can be identified by a large warehouse at its eastern extremity; Rocher Tente (Adriamihali or Tent rock), 13 feet (4<sup>m</sup>0) high, lying close offshore, about half a mile eastward of Saolara, is a white rectangular rock, the larger of two detached rocks, and is visible from a distance of 2 miles.

From Ampasimanoro some white cliffs, which are very conspicuous when the sun is shining on them, extend west-south-westward to a gap about a mile west-south-westward of Ampasimanoro, formed by the entrance to the Lovocampy valley, where there is a sandy beach. The cliffs thence recede inland, and extend southward.

A narrow sandy ridge extends about 1½ miles south-south-eastward of Ny Andrea, and near its centre stands the village of Tamboabo; the village of Ianatsony is situated about 3 cables north-north-eastward of Tamboabo.

A detached shoal, with a least depth of 2½ fathoms (4<sup>m</sup>6) over it, lies about 4 cables west-south-westward of Barn Hill point.

Westward of Saolara the southern side of the bay is fringed by a reef extending as much as 6 cables offshore; off the north-western edge of this reef, about 3½ miles westward of Saolara, lies a detached coral bank, with a least depth of 6½ fathoms (11<sup>m</sup>9), over which the sea breaks in bad weather.

**Tidal streams.**—Along the southern side of the bay the flood stream sets eastward, at a rate of about a quarter of a knot; the ebb stream sets westward, at a rate of about half a knot.

**Directions.**—A vessel coming from northward and bound for Baie de St. Augustin should identify Mahinia hill and the delta of the Fihérénana; then the white cliffs at the head of the bay can be seen.

From southward the valley of Rivière Onilahy, with the surrounding high land, is conspicuous, as it is the first valley northward of the southern extremity of Madagascar.

**Anchorage.**—The anchorage off Saolara is sheltered from all winds except those between north and west, and vessels may find anchorage there closer in or farther out, according to the season.

*Charts 760, 597, 748a.*

*Chart 692.*

During the monsoon, from April to October, vessels should anchor close inshore in depths of about 9 fathoms (16<sup>m</sup>5), stiff mud, with Ampasimanoro (*Lat.* 23° 34' S., *Long.* 43° 45' E.) bearing 068° and  
 5 Rocher Tente 138°.

At other seasons vessels should anchor in depths of from 15 to 16 fathoms (27<sup>m</sup>4 to 29<sup>m</sup>3), with Ampasimanoro bearing 081° and Rocher Tente 158°.

The sea gets up very quickly at these anchorages, and vessels should  
 10 have a second anchor in readiness for letting go.

Small vessels with local knowledge can obtain securer anchorage between November and March, within Passe du Sud, between the reefs off Pointe Sarodrano.

Landing can be effected at Saolara, through a gap in the coastal reef  
 15 which does not quite dry; the western end of this village can be approached at all states of the tide.

Fresh provisions can be obtained at Saolara, but vegetables are scarce.

**Rivière Onilahy.**—Rivière Onilahy flows into the sea between  
 20 Ampasimanoro and a low narrow sandy point about 2½ cables northward; the southern extremity of the latter point is subject to constant changes during the rainy season.

The river is practicable for small craft with local knowledge when the tide has risen sufficiently, but access is only easy at high water. There  
 25 is no bar, at least during winds between east and south, but it would not be prudent to attempt to enter when there is a north-westerly swell.

With fresh winds between south and south-west the sea breaks over the banks which extend westward of Ampasimanoro; small craft should give these banks a wide berth, as they are liable to great changes,  
 30 both in shape and appearance, especially between November and March.

**Caution.**—From Tuléar to Cap Sainte-Marie the survey of the coast is inaccurate. The positions of the islands, dangers, and lines of soundings shown on the charts, in 1933, are in error relatively to the  
 35 coast as well as in absolute position.

*Chart 760.*

**COAST.**—**Aspect.**—From Baie de St. Augustin the coast, for a distance of about 100 miles south-south-eastward, is backed by a level plain rising by three distinct steps, or ranges of hills, parallel with the  
 40 coast, to a tableland of from 1,000 to 1,400 feet (304<sup>m</sup>8 to 426<sup>m</sup>7) high; the nearest range to the coast being about 5 miles and the farthest from 13 to 15 miles inland. The coast is composed of white sandhills, of moderate elevation, on which stand several grey trees; it is fringed by a reef, over the edge of which the sea breaks.

This stretch of coast affords no anchorage until southward of Cap Andriamanao, which is situated about 87 miles south-south-eastward of Ampasimanoro (Ampasimanuru).

Land and sea breezes are regular along the whole stretch of coast.

**Currents.**—There does not appear to be much current off this  
 50 stretch of the coast northward of Barrow point (*Lat.* 25° 15' S., *Long.* 44° 21' E.), which is situated about 105 miles south-south-eastward of Baie de St. Augustin. Southward of this point the *Scorpion*, in 1900, experienced a current of about one knot, setting towards the land

*Charts 760, 597, 748a.*

*Chart 760.*

when off the mouth of Rivière Menarandra, about 18 miles eastward of Barrow point.

*Chart 692.*

**Coast.—Dangers.**—From Saolara to Pointe d'Anakao,  $6\frac{1}{2}$  miles south-westward, the coast is low and sandy, and is backed by a screen of trees; it is fringed by a reef which extends as much as 7 cables offshore, over which the sea breaks in places.

Pointe d'Anakao is low, flat, and rocky; it slopes to the coast from some low hills about half a mile inland. The village of Anakao is situated about three-quarters of a mile east-north-eastward of the point; a break in the coastal reef gives boats access to it.

**Off-lying islet and danger.**—Nosy Vé.—Nosy Vé, lying about 2 miles north-westward of Pointe d'Anakao, is a low-lying white sandy uninhabited islet, with a little brushwood, also a clump of casuarina trees near its northern end; there are the ruins of an old settlement on this islet, and two small columns, 5 feet ( $1^m5$ ) in height, close south-westward of its south-eastern point.

Nosy Vé lies on the eastern side of a reef, which extends about  $1\frac{1}{2}$  miles north-north-westward and three-quarters of a mile westward and southward of it. A coral bank, over which the sea breaks heavily in bad weather, extends about  $1\frac{1}{2}$  miles north-north-eastward of the northern extremity of this reef; it has a least depth of  $4\frac{1}{2}$  fathoms ( $8^m2$ ) over it.

**Directions.—Anchorage.**—A vessel approaching the coast immediately southward of Baie de St. Augustin, from northward, should identify Mahinia hill (page 249) and, keeping a prudent distance offshore, when it is on an easterly bearing steer for Pointe d'Anakao, with that point bearing about  $176^\circ$ , which leads towards the anchorage.

A vessel coming from southward should steer for a point, covered with trees, situated about 3 miles west-south-westward of Saolara, bearing  $039^\circ$ , which leads through the fairway south-eastward of Nosy Vé, in depths of about 9 fathoms ( $16^m5$ ).

The channel between Nosy Vé and the coast affords anchorage sheltered from winds between south and west.

The best anchorage is in depths of  $5\frac{1}{2}$  fathoms ( $10^m1$ ), sand and coral, moderate holding ground, with the northern extremity of Nosy Vé bearing  $253^\circ$  and the southern extremity  $195^\circ$ . As a general rule vessels should not anchor in depths of less than  $5\frac{1}{2}$  fathoms ( $10^m1$ ), and should veer a good scope of cable.

Landing is easy in ordinary weather, and the sea is calm on the beach; at high water boats can land anywhere on the eastern coast of Nosy Vé, but at low water they are stopped by a coral reef, and the best landing place then is about half a cable northward of some ruined huts.

**Tidal streams.**—The tidal streams on the eastern side of Nosy Vé (*Lat.  $23^\circ 39' S.$ , Long.  $43^\circ 36' E.$* ) are fairly strong, and the changes of the wind cause vessels at anchor to be continually swinging, which sometimes causes the anchor to drag.

The flood stream sets north-north-westward and the ebb stream south-south-eastward; they attain a maximum rate of one knot at 3 hours before and after high water.

*Chart 760.*

**Coast.**—Lanivato cliffs, about 35 miles southward of Pointe d'Anakao, are really only sandhills, a little higher than those northward

*Charts 760, 597, 748a.*



*Chart 760.*

and southward of them. When seen from a short distance offshore and under certain conditions of the light they have the appearance of being steep cliffs; it is to this they owe their name.

- 5 Roches de Lanivato, above water, lie close offshore about 49 miles southward of Pointe d'Anakao.

Anse Itampolo, about 12 miles south-south-eastward of Roches de Lanivato, can be identified by a round hill in the second range of hills, which disappears behind the first range when approaching the coast.

- 10 Immediately northward of this creek an old military post, with a flagstaff, stands on the crest of a sandhill; near it is a large tamarind tree. A few cables northward of this post the sandhills decrease in elevation, and some clumps of casuarina trees border the coast; in the morning these clumps look like boats' sails. Several villages can be  
15 seen in this neighbourhood.

- Anchorage.—Directions.—Dangers.**—A small vessel with local knowledge making the anchorage in Anse Itampolo should steer towards this creek with the flagstaff of the old military post bearing 080° until close to the coastal reef forming the southern side of the  
20 creek, when she can enter it, anchoring with the flagstaff bearing 055° and the point of land southward bearing between 165° and 185°, according to the draught of water. This anchorage is sheltered from wind and swell, except from between west-south-west and north, when it is dangerous to anchor here.

- 25 Boats can land abreast the old military post, rounding the end of the coastal reef which fronts it.

- Coast.**—From Anse Itampolo the coast, which is low, white, sandy, and fringed by a reef, trends about 23 miles south-south-eastward to Cap Andriamanao; the coastal plain is here from 5 to 8 miles wide up  
30 to the first range of hills, which has the appearance of cliffs.

Cap Andriamanao consists of a conical sandhill covered with casuarina trees.

- Southward of Cap Andriamanao the edge of the coastal reef extends further seaward forming within it Mouillage d'Andriamanao, Mouillage  
35 d'Androka, and Port Cruizer. These anchorages lie close together, and afford, between them, shelter to vessels with local knowledge, against all winds, the first from southerly, the second from offshore, and the third from northerly winds.

- Off-lying islets and dangers.**—Nosy Borona, lying about 4 miles  
40 southward of Cap Andriamanao (*Lat. 25° 00' S., Long. 44° 08' E.*) and 2½ miles offshore, is a flat sandy islet fringed by a reef, which extends about a quarter of a mile north-westward of it; small craft, with local knowledge, may pass inside this islet at high water.

- Nosy Manitsa, lying about 11½ miles south-eastward of Nosy Borona  
45 and 4 miles offshore, is moderately high, and is fringed with a reef.

- Tozer patch, with depths of less than 6 feet (1<sup>m</sup>8) over it, lies about 3 miles westward of Nosy Manitsa; in fine weather the sea only breaks over this patch at long intervals. A vessel coming from seaward should, on account of this danger, not approach the coast with Nosy  
50 Manitsa on a south-easterly bearing.

**Anchorage.—Directions.**—Mouillage d'Andriamanao affords shelter from southerly winds. Small vessels with local knowledge can obtain anchorage here between the coast and the northern extremity of a detached reef lying close offshore; eastward of the northern

*Charts 597, 748a.*

*Chart 760.*

extremity of this reef there are depths of from 6 to  $6\frac{1}{2}$  fathoms (11<sup>m</sup>0 to 11<sup>m</sup>9).

About one mile northward of this anchorage is a detached reef, in the neighbourhood of which the *Sagittaire* found depths of not less than  $5\frac{1}{2}$  fathoms (10<sup>m</sup>1). 5

At high water small craft with local knowledge can cross the shallow bank which separates this anchorage from Mouillage d'Androka close southward.

Mouillage d'Androka, close southward of Cap Andriamanao, affords 10 shelter except from winds between south-west and west-north-west. The entrance lies between the southern extremity of the detached reef which forms the western side of Mouillage d'Andriamanao, on the northern side, and Nosy Borona and another detached reef, about one cable east-north-eastward of Nosy Borona, on the southern side; 15 the entrance is about half a mile wide, with a least depth, near the detached reef southward, of  $3\frac{3}{4}$  fathoms (6<sup>m</sup>9).

A masonry building, surrounded by coconut trees, which is the residence of the commandant of the military post and is situated about 3 miles north-eastward of Nosy Borona, bearing 077°, leads 20 through the entrance to Mouillage d'Androka in a least depth of  $5\frac{1}{2}$  fathoms (10<sup>m</sup>1).

Small vessels with local knowledge can anchor in depths of from  $4\frac{3}{4}$  to 6 fathoms (8<sup>m</sup>7 to 11<sup>m</sup>0), sand and mud, with Nosy Borona bearing 211°, Cap Andriamanao 328°, and the military post 081°. 25 There are some patches of reef which, owing to their dark colour, can easily be seen in calm weather, but it is advisable not to proceed within these patches until a complete examination of the locality has been made.

The landing place is in front of the village where there is the military 30 post mentioned above. When the sea is choppy at the anchorage it is dangerous to attempt to land on the beach in ship's boats, and communication should be made by native craft. Ampanihi, the chief town of this district, is connected with the general telegraph 35 system.

Small craft with local knowledge may pass from Mouillage d'Androka (Lat. 25° 02' S., Long. 44° 08' E.) to Port Cruiser, inside the reef, at high water.

From Mouillage d'Androka the coastal reef extends about 5 miles south-eastward enclosing a rounded sandy point within which the coast 40 forms Port Cruiser, which is exposed southward. Between the southern extremity of the coastal reef and the coast are some breakers, which must be left on the starboard hand when approaching this anchorage, steering for the white sandhill on the point.

Vessels with local knowledge can obtain anchorage in depths of 45  $4\frac{1}{2}$  fathoms (7<sup>m</sup>8) with the northern point, the fall of a conspicuous sandhill, bearing 315°, the southern extremity of the coastal reef 173°, and the isolated breakers 107°. This anchorage is not sheltered from wind and swell between south-south-east and south-south-west.

Between Port Cruiser and Barrow point the coast forms Baie de 50 Minirodu, called Ampalasi by the natives; Barrow point is very low-lying, and terminates in a narrow tongue of rock and sand.

Baie de Minirodu is a poor anchorage, as winds between south and west raise a heavy swell, which runs round Barrow point, and causes

*Chart 760.*

a high surf and a tidal race there ; with winds between north and west this anchorage is dangerous.

**Coast.**—From Barrow point the coast trends about 47 miles east-  
5 south-eastward to Cap Sainte-Marie, and appears to be free from dangers ; vessels should not, however, keep close inshore on a dark night.

Rivière Menarandra flows into the sea about 12 miles eastward of Barrow point ; at the entrance to this river are some rocks, above  
10 water, lying close offshore.

Roche Albatros, above water, lies about 9 miles north-westward of Cap Sainte-Marie and a quarter of a mile offshore.

**Banc de l'Etoile.**—Banc de l'Etoile (Star bank) fronts the coast from Barrow point to Cap Sainte-Marie. So far as it has been examined  
15 the depths over it appear regular ; in the central part, which extends farthest offshore, there are depths of 30 fathoms (54<sup>m</sup>9) about 28 miles offshore, decreasing gradually to depths of 17 or 18 fathoms (31<sup>m</sup>1 or 32<sup>m</sup>9) about 5 miles offshore.

In 1912, it was reported, by the *Cluny Castle*, that Banc de l'Etoile  
20 extends considerably farther southward than is shown on the charts.

Récifs de l'Etoile (Star reefs), several of which are visible, lie on the north-western edge of Banc de l'Etoile, about 5 miles south-westward of Barrow point ; the sea breaks over them heavily. There is a passage  
25 a berth of from one to 2 miles.

A rocky shoal, about a mile square, with depths of from 2 to 3 fathoms (3<sup>m</sup>7 to 5<sup>m</sup>5) over it, was reported, in 1937, to lie about 17 miles south-westward of Cap Sainte-Marie (*Lat. 25° 39' S., Long. 45° 06' E.*).

**30 Anchorage.**—Vessels, with local knowledge, can run along the coast over Banc de l'Etoile, and anchor if necessary during offshore winds, in depths of from 14 to 16 fathoms (25<sup>m</sup>6 to 29<sup>m</sup>3), about 2 or 3 miles offshore, but it would not be prudent to do so on a dark night.

Landing here is bad and, it should be remembered that even if it  
35 can be effected, a heavy swell may, without any warning, get up suddenly, and prevent boats getting off to the ship again for an indefinite period.

**Coast.**—The land north-westward of Cap Sainte-Marie, from within a mile offshore, appears as a high sandy cliff, with a flat summit, and  
40 devoid of vegetation.

Cap Sainte-Marie, the southern extremity of Madagascar, is a high rocky promontory, rising perpendicularly from the sea ; the land in its vicinity is high, and can be seen from a great distance. The extremity of the cape consists of some blackish rocks projecting about one mile  
45 from the cliffs, and terminating in an isolated pointed rock, only visible from eastward.

**Currents.**—For the description of the currents in the neighbourhood of Cap Sainte-Marie *see* pages 9, 15, and 17. It should be, however, remarked, that vessels, near the land in the neighbourhood of that cape,  
50 have found the current with a decided tendency to set towards the coast, sometimes at a rate of as much as a knot.

**Signal station.**—**Storm signals.**—There is a signal station at Cap Sainte-Marie (*Lat. 25° 39' S., Long. 45° 06' E.*).

Signals indicating the locality threatened by a cyclone, *see* page 27,  
55 are displayed.

*Charts 597, 748a.*

## CHAPTER IX

NORTH-EASTERN COAST OF MADAGASCAR; CAP D'AMBRE TO  
BAIE D'ANTONGIL*Chart 758.*

**NORTH-EASTERN COAST OF MADAGASCAR.—General remarks.**—Generally speaking, the north-eastern part of Madagascar consists of high land sloping steeply to the coast, which is intersected by a number of streams, useful as landmarks; the land is mostly pasture land, and there are some forests in the valleys. 5

The coast is mostly steep-to, particularly between Vohémar, about 94 miles south-south-eastward of the northern extremity of Madagascar (Lat.  $11^{\circ} 58'$  S., Long.  $49^{\circ} 16'$  E.), and Cap Est (Cape East), about 120 miles farther south-south-eastward, and vessels can keep fairly close inshore. It is fronted by a bank, which enables a vessel to obtain warning of its approach to the coast by sounding; at a distance of about 5 miles offshore the depths are great. 10

During the night, especially during the north-west monsoon, i.e., from November to March inclusive, great caution is necessary if proceeding along the coast. 15

**Local weather.**—See pages 48-51.

*Chart 1002.*

**Coast.—Aspect.**—Cap d' Ambre, the northern extremity of Madagascar, consists of three points, of which the central is scarcely more salient than the others; each point is low, rocky, and bordered by islets. The central point is the termination of a large regular plain of moderate height which has a barren parched appearance, and is visible from a distance of 15 or 20 miles; this barren parched appearance is particularly noticeable at the end of the dry season, viz., at the end of September, but this is modified with the return of the rains. 20 25

From north-eastward the most conspicuous hill is Bobaala, about  $2\frac{1}{2}$  miles southward of Cap d'Ambre, which attains an elevation of 758 feet (231<sup>m</sup>).

Near the coast, between Cap d'Ambre and Cap Tanifotsy, the northern entrance point of Baie de Diégo-Suarez, about 17 miles south-south-eastward, is a number of hills, high and regular; Ambohibiri, or La Poule (page 153), situated about midway between Cap d'Ambre and Baie de Diégo-Suarez, is the most conspicuous of these hills, all of which have barren slopes, but their summits are covered with grass. 30 35

*Charts 1002, 758.*

Andramaimbo, Ankaramisampana, and Montagne d'Ambre, are described on pages 145-146.

*Charts 758, 2762, 2899, 597.*

*Chart 1002.*

**Current.**—Between Cap d'Ambre and Baie de Diégo-Suarez the current, especially during the south-east monsoon, sets towards the shore, and vessels proceeding along this coast should keep not less than 5 4 miles offshore.

**Tidal streams.**—See page 146.

The following is the result of observations of the combined current and tidal streams made in February, 1907, at a position one mile south-eastward of Cap d'Ambre: At low water,  $312^{\circ}$ , rate 2 knots; 10 one hour after low water,  $312^{\circ}$ , 2 knots; 2 hours after low water,  $312^{\circ}$ ,  $2\frac{1}{2}$  knots; half flood,  $312^{\circ}$ ,  $2\frac{3}{4}$  knots; 4 hours after low water,  $326^{\circ}$ ,  $2\frac{3}{4}$  knots; 5 hours after low water,  $338^{\circ}$ , one knot. At high water,  $000^{\circ}$ , rate half a knot; one hour after high water,  $162^{\circ}$ , one knot; 2 hours after high water,  $202^{\circ}$ ,  $1\frac{1}{2}$  knots; half ebb,  $241^{\circ}$ , 15  $1\frac{1}{2}$  knots; 4 hours after high water,  $269^{\circ}$ ,  $1\frac{1}{2}$  knots; 5 hours after high water,  $309^{\circ}$ ,  $2\frac{1}{2}$  knots.

**Directions.**—The directions for a vessel rounding Cap d'Ambre (*Lat.*  $11^{\circ} 58' S.$ , *Long.*  $49^{\circ} 16' E.$ ) from westward are given on pages 146-147.

20 **Coast.—Dangers.—Light.**—Between Cap Ambohitramporia, the western extremity of Cap d'Ambre, and Cap André, the eastern extremity, about  $1\frac{1}{4}$  miles eastward, the coast is fringed by a reef extending about 3 cables offshore.

A light is exhibited at an elevation of 210 feet ( $64^m0$ ) from an 25 octagonal concrete tower, 105 feet ( $32^m0$ ) in height, situated on Cap André.

Between Cap André and Cap Tanifotsy the coast forms a few small bays, which are too exposed to afford shelter; Baie Maxime and Baie de la Dune lie about 3 miles south-eastward and  $6\frac{1}{2}$  miles south-south- 30 eastward, respectively, of Cap André light-tower.

Ilôt Long, 30 feet ( $9^m1$ ) high, about  $3\frac{1}{4}$  miles south-eastward of Cap André light-tower, lies close offshore, on the southern side of the approach to Baie Maxime; Le Grappin, an above-water rock, 16 feet ( $4^m9$ ) high, lies on the coastal bank on the southern side of the entrance 35 to Baie de la Dune, about  $3\frac{1}{4}$  miles south-south-eastward of Ilôt Long.

A coral reef fringes the coast from Cap d'Ambre to within about 5 miles of the entrance to Baie de Diégo-Suarez; thence there is a detached barrier reef, on which lie some bare islands.

Pointe Bemahia is situated about  $3\frac{1}{4}$  miles south-south-eastward of 40 Le Grappin, and between it and Cape Tanifotsy the coast is composed of sandhills, decreasing in elevation southward, backed by lightly wooded hills, rising gradually to the peninsula terminating in Cape Tanifotsy.

Baie d'Antaly lies on the south-western side of Pointe Bemahia. 45 *Charts 1116, 1002.*

Nosy Antaly Bé, the northernmost island on the detached barrier reef mentioned above, is 121 feet ( $36^m9$ ) high; Nosy Antaly Kély lies on the same reef close southward of Nosy Antaly Bé.

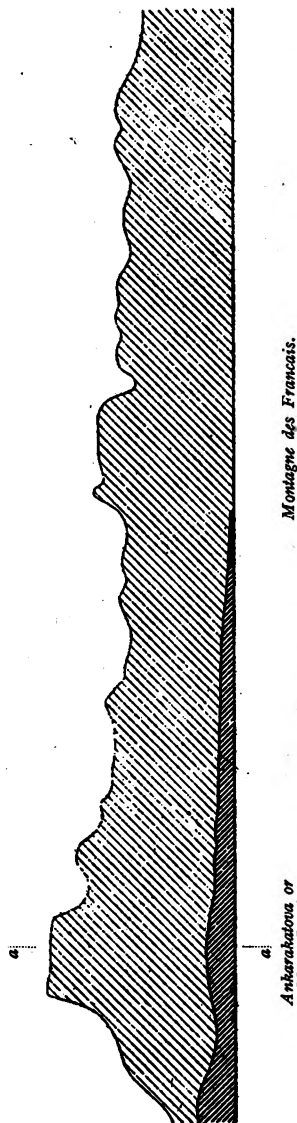
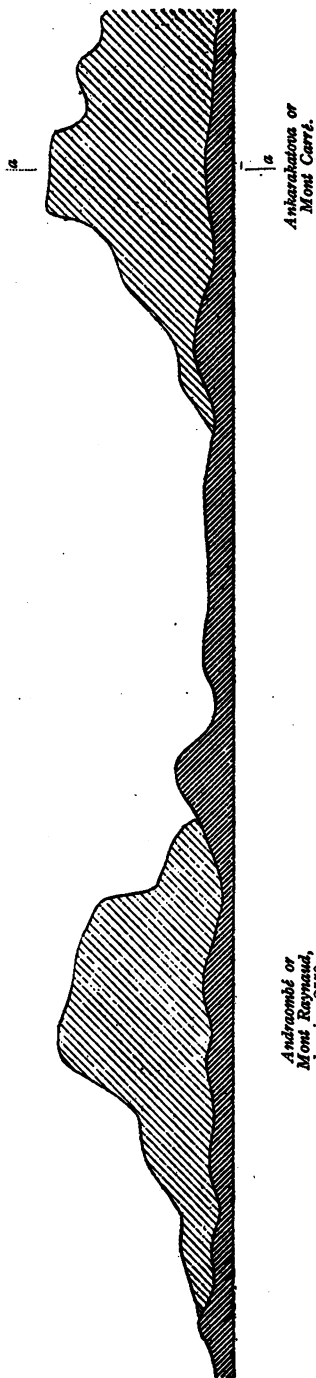
*Chart 1116.*

50 Nosy Lava is the name given to that part of the detached barrier reef which lies southward of Nosy Antaly Kély and is connected with Cap Tanifotsy; Ile Suarez, 79 feet ( $24^m1$ ) high, with Ile Diégo, 33 feet ( $10^m1$ ) high, close south-eastward of it, lies on the northern part of this reef, and may be approached within half a mile of their eastern coasts.

*Charts 758, 2762, 2899.*



To face page 261.



View, in two parts, of approach to Baie de Diégo-Suarez from 23 miles south-eastward.

(Original dated prior to 1934.)

*Chart 1116.*

A reef, with depths of less than 6 feet (1<sup>m</sup>8) over it, extends about 4 cables north-north-eastward of the north-western extremity of Nosy Lava, and Nosy Toréki lies at its north-eastern end ; Rochers du Sud, 17 feet (5<sup>m</sup>2) high, lie on the eastern edge of Nosy Lava, about 1½ cables southward of the southern extremity of Ile Diégo. 5

The sea breaks heavily over these reefs during the south-east monsoon, from May to November.

Baie de Mahajeby lies between the coast and the barrier reef described above ; it is entered between Pointe Tortue, the southern extremity of Nosy Antaly Kély, and Nosy Toréki (*Lat. 12° 10' S., Long. 49° 23' E.*), but it is encumbered with shoals, and the northern and southern parts of the bay are very shallow. 10

**BAIE DE DIÉGO-SUAREZ.—General remarks.**—Baie de Diégo-Suarez, known as Antomboka by the natives, is entered between Cap Tanifotsy and Cap Andranomody, about one mile south-westward ; it is a fine harbour, with a French naval base at Port de la Nièvre, on the southern side of the bay. 15

The shores of the harbour are indented by four inlets, viz. Baie du Tonnerre and Baie des Cailloux Blancs, on its northern side, and Baie des Francais and Port de la Nièvre, on its southern side ; these inlets afford sheltered anchorage, according to the season, to large vessels. The bays abound with fish. 20

Baie de Diégo-Suarez is one of the least unhealthy places on this coast, and different parts of the bay vary in point of salubrity according to circumstances, and especially according to the nature and height of the ground. Fever is less frequent here than at other places on the coast. Dysentery is not common, and rarely assumes a formidable character. The dry season is healthy, and acts as a tonic on those prostrated during the hot weather. 30

*Charts 1116, 1002, 758.*

**Aspect.—Landmarks.**—Montagne d'Ambre (page 145), 40 miles southward of Cap d'Ambre, though an excellent landmark, is frequently obscured by clouds.

A vessel approaching from south-eastward can, if the weather is sufficiently clear, identify Tsaramborona, or Le Pouce, a mountain, 2,224 feet (677<sup>m</sup>9) high, about 35 miles south-eastward of Montagne d'Ambre ; it is most conspicuous, rising in the form of an eagle's beak with a deep cut on its right side, and when bearing more than 270° and clear of the high land behind it is even more conspicuous. Further northward, near the coast, Andraombé, or Mont Raynaud, 1,319 feet (402<sup>m</sup>0) high, about 31 miles north-north-westward of Tsaramborona, and Ankarakatova, or Mont Carré, 1,385 feet (422<sup>m</sup>1) high, about 4 miles north-westward of Andraombé, are easily identifiable. 40

*Charts 1116, 1002.*

When approaching the entrance Montagne des Francais, which attains an elevation of 1,473 feet (449<sup>m</sup>0), overlooks Baie des Francais ; Andraombé forms the southern extremity of this mountain. 45

*Chart 1116.*

Pain de Sucre (Dundas islet), an islet, 397 feet (121<sup>m</sup>0) high, covered with bushes, seen over the low land northward of Montagne des Francais, is an excellent landmark, within a distance of about 15 miles.

See view facing this page.

*Charts 1002, 758, 2762, 2899, 597.*



*Chart 1116.*

Andramaimbo (page 145),  $11\frac{1}{2}$  miles westward of Cap Andranomody, is a good landmark for making the entrance to Baie de Diégo-Suarez.

**Tidal streams.**—The tidal streams in Passe d'Orongéa attain rates of from one to  $2\frac{1}{2}$  knots. Inside the entrance the flood stream makes from about half an hour before low water until about half an hour after high water at Port de la Nièvre (*Lat.  $12^{\circ} 16' S.$ , Long.  $49^{\circ} 18' E.$* ).

Outside the entrance the following observations were made at springs. At low water, southward of the entrance, the stream sets towards the entrance; northward of the entrance, it sets towards Cap d'Ambre; one hour after low water, southward of the entrance, it is slightly deflected towards Baie d'Ambodivahibé; at half flood, it sets directly into the entrance along the coast, from Baie de Rigny, the rate in the entrance being  $2\frac{1}{2}$  knots. At high water, off the entrance, both northward and southward, the stream is very weak; in the entrance there is still a stream flowing in at the rate of a quarter of a knot; one hour after high water it sets out of the entrance at the rate of a quarter of a knot; northward of the entrance it sets down the coast, and southward of the entrance south-eastward; at half ebb, it sets east-south-eastward out of the entrance, at a rate of  $1\frac{1}{2}$  knots, being slightly deflected northward and southward on leaving the coast.

**Pilotage.**—Pilotage is optional, except for merchant vessels wishing to enter the French naval base. Any vessel requiring the assistance of a pilot to enter the harbour should notify the Port Officer by radio, stating the date and time of its arrival.

*Chart 1064, plan of Oronjia pass.*

**Signal station.**—**Storm signals.**—A signal station stands close to the lighthouse eastward of Cap Andranomody which can communicate with vessels by the International Code of Signals.

Signals indicating the locality threatened by a cyclone, see page 27, are shown.

*Chart 1116.*

**Islets and dangers in approach.**—The reef and islets northward of the entrance are described on pages 260 and 261.

On the southern side of the entrance the coast, which is fringed by a reef on which lie numerous islets, trends about 6 miles south-south-eastward to Baie d'Ampio, and is fronted by an extensive bank, with depths of less than 10 fathoms ( $18^m3$ ) over it, which extends as much as  $3\frac{1}{2}$  miles offshore.

Nosy Angongo, 46 feet ( $14^m0$ ) high, lying close offshore on this bank, about  $2\frac{1}{2}$  miles east-south-eastward of Cap Andranomody, is bare, rocky, and fringed by a coral reef, over which the sea breaks.

Banc de l'Yvonne, a detached coral head, with a depth of  $7\frac{1}{2}$  fathoms ( $13^m8$ ) over it, lies about 2 miles east-north-eastward of Nosy Angongo; Banc d'Angongo, with a least depth of  $6\frac{1}{2}$  fathoms ( $11^m9$ ), and Banc du Nord-Est, a detached coral head, with a depth of  $5\frac{1}{2}$  fathoms ( $9^m6$ ), lie about  $1\frac{1}{2}$  and  $3\frac{1}{2}$  miles, respectively, eastward of the same islet; Le Grand Banc is the name given to the eastern part of this extensive bank southward of Banc du Nord-Est; Banc de la Manatangen, with a least depth of one fathom ( $1^m8$ ), extends about 3 miles northward of Baie d'Ampio.

*Charts 1116, 1002.*

Ile Suarez (*Lat.  $12^{\circ} 10' S.$ , Long.  $49^{\circ} 24' E.$* ) in line with Ambohibiri (page 259), bearing  $315^{\circ}$ , leads north-eastward of these dangers.

*Charts 1002, 758, 2762, 2899.*

*Chart 1064, plan of Oronjia pass.***Entrance.—Dangers.—Beacons.—Prohibited anchorage.—**

Passe d'Orongéa (Oronjia pass), the navigable channel of which has a least width of about  $3\frac{1}{2}$  cables, lies between the coast eastward of Cap Andranomody and Nosy Volana, about  $6\frac{1}{2}$  cables north-north-eastward; it is often very rough here during the south-east monsoon, especially with a falling tide, and low-powered vessels are advised to proceed out of harbour with a rising tide. 5

The southern side of the entrance channel consists of high cliffs, sloping steeply to the coast; vessels can keep fairly close to this side 10 of the channel.

Nosy Volana, 95 feet (29<sup>m</sup>0) high, is wedge-shaped, and slopes seaward; near the summit of the islet are the ruins of a chimney, which can be seen from a distance of about 8 miles, and on its south-eastern side stands a masonry beacon which is not conspicuous. A coral reef, 15 on which there are several rocks, above water, connects this islet with Cap Tanifotsy, and a bank, with depths of less than 3 fathoms (5<sup>m</sup>5) over it, extends about 2 cables south-eastward and southward of Nosy Volana.

*Charts 1064, plan of Oronjia pass; 1116.*

Cap Andranomody, or Miné, is 128 feet (39<sup>m</sup>0) high, and the land behind it rises,  $1\frac{1}{2}$  miles inland, to Mamelons d'Ankorika, which attain an elevation of 381 feet (116<sup>m</sup>1). 20

*Chart 1064, plan of Oronjia pass.*

Several rocks, above water, lie close off Cap Andranomody, one 25 large black one, 20 feet (6<sup>m</sup>1) high, being especially conspicuous; immediately southward of these rocks a stone pier extends westward from the coast.

Foul ground was reported, in 1945, to extend across the western end of Passe d'Orongéa, as indicated by pecked lines on the plan. Vessels 30 are prohibited from anchoring within about 2 cables eastward and westward of this area.

*Chart 1116.*

Two triangular masonry beacons, painted white with a black base, are situated about 7 cables north-westward of Cap Tanifotsy. 35

Nosy Langoro (Nosi Langor), lying about  $2\frac{1}{2}$  miles westward of Cap Andranomody, is 30 feet (9<sup>m</sup>1) high, flat, and fringed by a coral reef; a rocky shoal, with a depth of  $2\frac{1}{2}$  fathoms (4<sup>m</sup>6) over it, lies about  $2\frac{1}{2}$  cables south-south-eastward of it.

A shoal, with a least depth of  $5\frac{1}{2}$  fathoms (9<sup>m</sup>6), coral, lies about 40  $1\frac{1}{2}$  miles west-south-westward of Nosy Langoro.

*Chart 1064, plan of Oronjia pass.*

**Lights.**—A light is exhibited, at an elevation of 124 feet (37<sup>m</sup>8), from a circular iron tower on a masonry base, 30 feet (9<sup>m</sup>1) in height, situated about 7 cables east-south-eastward of Cape Andranomody. 45 On account of its sandy colour it is not easily distinguishable by day.

*Chart 1116.*

A light is exhibited, at an elevation of 59 feet (18<sup>m</sup>0), from the terrace of a grey rectangular house, 16 feet (4<sup>m</sup>9) in height, situated on Nosy 50 Langoro (Lat.  $12^{\circ} 13' S.$ , Long.  $49^{\circ} 20' E.$ ).

**Directions.**—The approaches to Baie de Diégo-Suarez are not difficult during clear weather, which is generally the case during the south-east monsoon, i.e. from April to October, but there is a heavy

*Charts 1116, 1002, 758, 2762.*

*Chart 1116.*

south-easterly swell at this season ; during the rainy season, i.e. from September to April, when rain squalls obscure the land, it is important to identify the landmarks before standing westward. It must also  
 5 be remembered that there is a north-going current which attains or even exceeds a rate of 3 knots.

*Charts 1116, 1002.*

Approaching from northward, it is best for a vessel to make Cap d'Ambre, which point is easily identifiable ; thence she can proceed  
 10 safely southward along the coast at a distance of about 2 miles and, even if the weather is not clear, identify the various landmarks, particularly Ile Suarez and Ile Diégo, whence the entrance to Passe d'Orongéa can be steered for. But course should not be altered westward into the entrance channel until Nosy Volana is open southward  
 15 of Cap Tanifotsy, as Nosy Volana masks Cap Andranomody, and the opening between Nosy Volana and Cap Tanifotsy might be mistaken for the entrance ; this, however, is easily avoided as there is a beacon on the islet and a light-tower on the southern side of the entrance. Cap Andranomody has a reddish appearance when seen behind Nosy  
 20 Volana.

The land near this part of the coast is mostly well wooded.

At night the lights at Cap d'Ambre, Cap Andranomody, and Nosy Langoro are sufficient guides for approaching Baie de Diégo-Suarez, but a vessel should perhaps keep a little farther offshore than during  
 25 daylight.

The aspect of the land from south-eastward is described on page 261.

*Charts 1064, plan of Oronjia pass ; 1116, 1002, 758.*

A vessel approaching from eastward should make the land in about lat. 12° 30' S. ; on nearing the entrance, Cap Andranomody is more  
 30 easily identified than the light-tower 7 cables east-south-eastward, above which latter Andramaimbo will be seen.

*Charts 1064, plan of Oronjia pass ; 1116.*

The best leading mark through Passe d'Orongéa is Nosy Langoro, bearing 275°, and seen between Ankaramisampana (page 146) and  
 35 Andramaimbo, which leads nearly midway through the fairway ; this line must be strictly adhered to, but in bad weather it is best to keep Nosy Langoro in line with Andramaimbo, bearing about 274°.

When through Passe d'Orongéa a vessel will be in smooth water, and she should keep on the same leading line until within about 1½ miles  
 40 of Nosy Langoro, steering thence with the black and white triangular beacons 7 cables north-westward of Cap Tanifotsy in line, astern, bearing 050°, which leads through the fairway to the entrance to Port de la Nièvre ; large vessels must be careful to avoid some shoals, with depths of from 6 to 7 fathoms (11<sup>m</sup>0 to 12<sup>m</sup>9), close north-westward of  
 45 the leading line.

*At night.*—A vessel should approach on a bearing of Cap Andranomody light until the entrance can be seen, then she should steer in a *white* sector of Nosy Langoro light (Lat. 12° 13' S., Long. 49° 20' E.), between the bearings of 272° and 275°, passing through the *red* sector  
 50 of Port de la Nièvre light (page 267), between the bearings of 227° and 237° ; when this latter light turns to *white*, bearing 227°, course should be altered south-westward, and a vessel should steer in a *white* sector of Port de la Nièvre light, between the bearings of 227° and 220°, until Nosy Langoro light bears 000°, to avoid the shoals southward of

*Charts 1002, 758, 2762.*

*Charts 1064, plan of Oronjia pass; 1116.*

that island. Thence she should steer for the entrance to Port de la Nièvre and enter the harbour steering in the *white* sector of Nosy Langoro light, between the bearings of 033° and 038°; care must be taken to avoid the shoals, with depths of 6½ and 6 fathoms (11<sup>m</sup>9 and 11<sup>m</sup>0), lying within 1½ miles south-south-westward of Nosy Langoro.

If coming from northward a vessel should keep Cap d'Ambre light in sight until Cap Andranomody light is seen.

*Chart 1116.*

**Northern side of bay.—Baie du Tonnerre.**—Baie du Tonnerre, 10 the easternmost bay on the northern side of Baie de Diégo-Suarez, is entered between Cap Tanifotsy and Cap Vatomainity, about 3½ miles westward; the holding ground, consisting of coral, covered with a thin layer of mud, is not good. The whole bay is much exposed to the south-east monsoon. 15

Cap Vatomainity, the southern extremity of Presqu'île Anoritabé, is a barren hill, 243 feet (74<sup>m</sup>1) high, of a dark colour, which slopes gradually north-westward; at the foot of this hill is a bench-mark painted in white and black horizontal bands.

The eastern side of Baie du Tonnerre is cliffy, wooded, and nearly 20 steep-to; the western side is fringed by a coral reef, which dries, and extends as far as 6½ cables offshore, on the northern part of which lies a black flat rock.

**Baie des Cailloux Blancs.—Aspect.**—Baie des Cailloux Blancs is entered between Cap Vatomainity and Pointe Andrahompotsy, about 25 2 miles south-westward.

On the western side of this bay is a conspicuous range of hills, of which Ankaramisampana and Andramaimbo are the highest peaks; about 1½ miles north-eastward of the former peak is Bobaombyvatobé, 866 feet (264<sup>m</sup>0) high, and about 1½ miles south-south-westward of 30 Ankaramisampana is a peak, 883 feet (269<sup>m</sup>1) high. At the foot of this range is Sommet Trapèze, about 9 cables eastward of the 883-foot (269<sup>m</sup>1) hill, and attaining an elevation of 161 feet (49<sup>m</sup>1). A conspicuous boulder lies on the side of the hills about 1½ miles northward of Bobaombyvatobé. 35

Presqu'île Ankorokorobé (*Lat. 12° 12' S., Long. 49° 15' E.*), which forms the western side of Baie des Cailloux Blancs, attains an elevation of 226 feet (68<sup>m</sup>9).

Several coves indent the shores of Baie des Cailloux Blancs, i.e. Anse Farafakabé, Baie Tsiala, Anse des Rafales, Anse Andohazampo, 40 and Anse du Bivouac.

**Islets and dangers.**—The most conspicuous islet is Ile du Sepulcre (Sepulchre islet) or Nosy Loapasana (Nosi Loatrafasana), lying about 1½ miles west-north-westward of Pointe Andrahompotsy and 2½ cables offshore; it is 325 feet (99<sup>m</sup>1) high, and perforated with caverns. 45

Nosy Koba, 46 feet (14<sup>m</sup>0) high and wooded, lies about 2½ miles west-north-westward of Cap Vatomainity and half a mile offshore; a coral reef, covered with sand, which dries, fringes its northern and eastern sides, and shoal water extends about 1½ cables northward of the northern extremity of this islet. 50

Nosy Fano (Nosi Fanu), 20 feet (6<sup>m</sup>1) high, lies about 5 cables from the western shore, on the coastal reef which separates Baie Tsiala and Anse des Rafales; some above-water rocks, from 2 to 3 feet (0<sup>m</sup>6 to 0<sup>m</sup>9) high, lie between Nosy Fano and the western shore.

*Charts 1002, 758, 2762.*

K\*

*Chart 1116.*

The only dangerous shoal in Baie des Cailloux Blancs is one with two rocky heads, with depths of  $2\frac{1}{2}$  and  $2\frac{1}{2}$  fathoms ( $4^m6$  and  $4^m1$ ) over them, respectively, which lie about 9 cables northward of Ile du Sepulcre.

- 5 The shoal, with a least depth of  $5\frac{1}{2}$  fathoms ( $9^m6$ ), about 7 cables north-north-eastward of Pointe Andrahompotsy, is mentioned on page 263.

**Anchorage.**—There is good anchorage in all the coves of Baie des Cailloux Blancs.

- 10 Very good anchorage can be obtained in Anse Farafakabé, in depths of from 5 to 10 fathoms ( $9^m1$  to  $18^m3$ ), mud, also in the cove north-eastward of Nosy Koba.

- There is excellent anchorage in Anse des Rafales, in depths of from  $6\frac{1}{2}$  to 7 fathoms ( $11^m9$  to  $12^m8$ ), mud, with Nosy Fano bearing  $030^\circ$   
15 and the northern extremity of Presqu'île Ankorokorobé in line with the southern extremity of Nosy Koba, bearing about  $099^\circ$ .

Anchorage can also be obtained in Anse du Bivouac, but when the south-east monsoon is blowing strongly a heavy swell may be experienced here.

- 20 *Charts 1064, plan of Oronjia pass; 1116.*

- Southern side of Baie de Diégo-Suarez.—Approach.—Dangers.**—**Buoy.**—Between Cap Andranomody and Pointe de l'Aigle, about  $4\frac{1}{2}$  cables south-westward, the coast forms a bay, which is shallow, with a rock, with a depth of less than 6 feet ( $1^m8$ ) over it,  
25 lying about  $1\frac{1}{2}$  cables north-eastward of Pointe de l'Aigle. The village of Orongéa (Oronjia) stands on the shore of this bay.

- From Pointe de l'Aigle the coast trends about  $1\frac{1}{2}$  miles south-south-westward to Pointe des Sables (*Lat.  $12^\circ 15' S.$ , Long.  $49^\circ 21' E.$* ), and thence about three-quarters of a mile southward, and is fronted by  
30 a bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, which extends as far as one mile offshore; from the north-western edge of this bank, a spit, with a least depth of  $3\frac{1}{2}$  fathoms ( $5^m9$ ), known as Banc d'Orongéa (Oronjia bank), extends about  $6\frac{1}{2}$  cables north-north-westward, and is covered by the red sector of Port de la Nièvre light, between the bear-  
35 ings of  $227^\circ$  and  $237^\circ$ .

A white conical buoy marks the edge of the sandbank extending about three-quarters of a mile west-south-westward of Pointe des Sables.

- Pointe des Sables is low, sandy, and bordered by a thick screen of  
40 trees. Camp d'Ankorika, a village, stands on a hill about a quarter of a mile east-north-eastward of the point, and the village of Andjamen a similar distance east-south-eastward.

- Shoals, with least depths of 7,  $6\frac{1}{2}$ , and 6 fathoms ( $12^m8$ ,  $11^m9$ , and  $11^m0$ ) over them, lie about 9 cables eastward,  $1\frac{1}{2}$  and  $1\frac{1}{2}$  miles south-  
45 south-westward, respectively, of Nosy Langoro lighthouse.

- Anchorage.**—There is well sheltered anchorage off the village of Orangéa in depths of 13 fathoms ( $23^m8$ ) with Nosy Langoro in line with Bobaombyvatobé, bearing  $285^\circ$ , and the western extremity of the trees on Pointe des Sables in line with the summit of Pain de Sucre,  
50 bearing  $201^\circ$ .

Landing can be effected at the stone pier close southward of Cap Andranomody.

*Chart 1116.*

**Baie des Francais.**—Baie des Francais is entered between Pointe

*Charts 1002, 758, 2762.*

**Chart 1116.**

des Sables and Pointe du Corail, about  $2\frac{1}{2}$  miles west-south-westward ; its shores are fringed by coral reefs, with thick clumps of mangroves. The western side of the bay, southward of Pointe du Polygone, a promontory, about  $1\frac{1}{2}$  miles south-eastward of Pointe du Corail, is 5 rocky.

At the head of the bay rises Montagne des Français, and in the south-western corner lies Pain de Sucre ; Rivière Betaitra, which flows along the western slope of Montagne des Français, loses itself in the mangroves near the village of Betaitra, which is situated about 10  $1\frac{1}{2}$  miles south-south-westward of Pain de Sucre.

**Anchorage.**—There is excellent anchorage in Baie des Français outside the 5-fathom ( $9^m1$ ) line, with good holding ground of mud, and well sheltered, especially during the south-east monsoon.

**Prohibited anchorage.**—Anchorage is prohibited within an area, 15 indicated by pecked lines on the chart, in the entrance to Baie des Français.

*Charts 1064, plan of Port Nièvre and Cul-de-Sac Gallois anchorages ; 1116.*

**Port de la Nièvre.**—Port de la Nièvre is entered between Pointe du 20 Corail and Cap Diégo (*Lat.  $12^{\circ} 15' S.$ , Long.  $49^{\circ} 18' E.$* ), about one mile west-north-westward, and extends about 3 miles south-westward, where it flows into a shallow basin, known as Cul-de-Sac Gallois ; the shores of this basin are bordered by mangroves.

The hospital, a large yellow building with a red roof, stands on 25 Pointe du Corail, and the Residency, a large grey house, with a flat roof, is situated midway between Pointe du Corail and the inner south-eastern entrance point.

Cap Diégo is the southern extremity of a bare promontory, with overhanging cliffs, which is conspicuous ; this promontory has three 30 summits, the western and highest attaining an elevation of 217 feet ( $66^m1$ ). On the eastern side of the promontory, at its inner end, is a hospital and a military establishment ; the village of Diégo is situated close westward of the inner end.

The north-western side of Port de la Nièvre is formed by steep hills, 35 but on the south-eastern side the hills slope more gently to the coast ; the south-eastern side is indented by Baie des Amis (Friends creek), about three-quarters of a mile south-south-westward of the inner south-eastern entrance point.

*Charts 1064, plan of Port Nièvre and Cul-de-Sac Gallois anchorages ; 40 1116, 758.*

Plaine d'Anamakia, through which flow Rivière de la Main and Rivière des Maques, bordered by mangroves, extends westward and south-westward from the inner part of Port de la Nièvre as far as the foot of Montagne d'Ambre ; this plain is low and marshy in many 45 places, but it is fertile.

*Chart 1064, plan of Port Nièvre and Cul-de-Sac Gallois anchorages.*

**Tidal streams.**—The tidal streams run strongly in Port de la Nièvre, especially the ebb stream.

**Lights.**—A light is exhibited at an elevation of 33 feet ( $10^m1$ ) 50 from a white tower, situated at the head of Antsirana wharf, on the south-eastern side of the entrance to Port de la Nièvre.

A light is exhibited from a white iron gallows at the landing place at Antsirana, about  $2\frac{1}{2}$  cables south-south-westward of Antsirana wharf light.

*Charts 1002, 758, 2762, 2899, 597.*

*Chart 1064, plan of Port Nièvre and Cul-de-Sac Gallois anchorages.*

A light is exhibited from the Naval signal tower, about  $2\frac{3}{4}$  cables south-south-westward of the light at the landing place.

**Islet and dangers.—Buoy.**—A shoal, with a least depth of 4 fathoms ( $7^m3$ ) over it, lies in the fairway, about  $3\frac{1}{2}$  cables southward of Cap Diégo, and is marked by a conical buoy, painted in red and black horizontal bands.

A shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m1$ ) over it, lies about 4 cables westward of Cap Diégo and  $1\frac{1}{2}$  cables offshore.

Shoals, with depths of  $2\frac{1}{2}$  and  $2\frac{3}{4}$  fathoms ( $4^m6$  and  $5^m0$ ) over them, lie about  $3\frac{1}{2}$  cables south-eastward and  $2\frac{1}{2}$  cables south-south-eastward, respectively, of Pointe des Mapous, a promontory about  $2\frac{3}{4}$  miles south-westward of Cap Diégo.

Ilot des Maques lies close offshore on the coastal bank, about half a cable north-north-westward of the western entrance point (*Lat.*  $12^\circ 18' S.$ , *Long.*  $49^\circ 15' E.$ ) of Rivière des Maques.

**Prohibited anchorage.**—Anchorage is prohibited, south-westward of an imaginary line drawn from a point situated on the south-western shore of Port de la Nièvre, about 9 cables south-westward of Antsirana wharf light-tower, in a north-westerly direction to Presqu'île d'Andrakaka, about  $6\frac{1}{4}$  cables north-westward.

Anchorage is also prohibited in Cul-de-Sac Gallois.

**Anchorages.**—Vessels can anchor, according to their draught, anywhere in Port de la Nièvre, where the bottom is mud; within depths of 8 fathoms ( $14^m6$ ) there is good holding ground. The position in which a vessel should anchor will be indicated by signal from the signal stations at Cap Andranomody and Antsirana.

A good berth for small vessels during the south-east monsoon is in depths of from  $4\frac{1}{2}$  to 5 fathoms ( $7^m8$  to  $9^m1$ ), mud, with the flagstaff at the Port office, which is situated on the north-eastern side of the landing place, in line with the top of the cathedral, about  $3\frac{1}{2}$  cables south-eastward of the flagstaff, bearing about  $128^\circ$ , and the two moles on the north-western side of the torpedo boat basin, about 4 cables south-westward of Antsirana wharf light, in line, bearing about  $213^\circ$ ; during the north-east monsoon it is prudent to anchor farther offshore.

The anchorage off Antsirana affords shelter during the first part of a cyclone passing northward of the port, with the wind between south and north-east, but if the wind backs past north-east it is necessary to shift billet and seek shelter in the anchorage under the lee of Cap Diégo. During a cyclone passing southward of the port, when the wind between south-west and west begins to freshen, vessels should anchor under Cap Diégo as close inshore as possible, avoiding the shoal, with a depth of  $2\frac{1}{2}$  fathoms ( $4^m1$ ) over it.

Vessels can obtain anchorage at the entrance to Cul-de-Sac Gallois, in depths of 11 fathoms ( $20^m1$ ), on an imaginary line joining Pointe des Mapous and Pointe des Chauves-Souris, about one mile west-south-westward; this anchorage, which is about  $2\frac{1}{2}$  cables northward of Ilot des Maques, has restricted swinging room.

**Buoys.**—Several mooring buoys are moored in front of the town of Antsirana.

**Wharf.**—A wharf, situated at the inner south-eastern entrance point of Port de la Nièvre, has depths of 26 feet ( $7^m9$ ) alongside; a vessel of about 390 feet ( $118^m9$ ) in length can use this wharf.

*Charts 1116, 1002, 758.*

*Chart 1064, plan of Port Nièvre and Cul-de-Sac Gallois anchorages.*

An area, indicated by pecked lines on the plan, situated in the approach to the wharf, was, in 1942, dredged to a depth of  $27\frac{1}{2}$  feet ( $8^m4$ ).

**Basin.**—The torpedo boat basin, about half a mile south-westward of Antsirana wharf, was dredged, in 1942, to a depth of  $16\frac{1}{2}$  feet ( $5^m0$ ). 6

**Antsirana.**—The town of Antsirana is situated on the south-eastern side of the entrance to Port de la Nièvre, and is the capital of the province of Diégo; it had a population, in 1941, of 15,024.

**Communications.**—There is regular steamer communication with 10 other Madagascan ports, also with Iles Comores, the Union of South Africa, and France.

Antsirana (Lat.  $12^{\circ} 16' S.$ , Long.  $49^{\circ} 18' E.$ ) is connected with the general telegraph system of Madagascar.

There is a radio station on the south-eastern side of Port de la Nièvre, 15 about 7 cables south-westward of the light on the Naval signal tower; see page 26.

**Port facilities.**—Fresh provisions are obtainable, and vegetables and fruit are plentiful from November to May.

Water is supplied by a water-boat, and can be pumped onboard at 20 a rate of 300 tons a day. To avoid delay vessels are advised to notify the quantity required in advance by means of radio.

There are two hospitals here.

There is usually a considerable stock of coal, but to ensure a supply, notice should be given in advance by means of radio. 25

Fuel oil is available; it is put onboard at the wharf or in dry dock.

Tugs and lighters are available.

There are several cranes, with a lifting capacity of as much as 8 tons.

**Deratisation.**—See page 21.

**Dry dock.**—**Channel.**—**Buoys.**—**Signals.**—There is a dry dock 30 at Antsirana; for dimensions see Appendix I.

Vessels entering or leaving this dry dock must exercise great caution on account of the prevailing winds and tidal streams. The channel leading to the dock was dredged, in 1944, to a least depth of 30 feet ( $9^m1$ ), but the buoys marking the limits of the channel must not be 35 depended on, nor the power of the tugs. During the south-east monsoon, the best time to enter or leave is about 0600 when the wind is light.

A vessel wishing to dock should, if possible, give as much as ten days notice. 40

Large repairs can be executed.

Flag No. 5 of the International Code of Signals is displayed from a flagstaff on the southern side of the entrance when a vessel can enter the dock; the vessel should acknowledge this signal, and commence 45 to move when the flag is lowered to half-mast.

**Storm signals.**—Signals indicating the locality threatened by a cyclone, see page 27, are shown from a flagstaff at the Port office.

*Chart 1116.*

**COAST.**—**Dangers.**—The coast between Passe d'Orongéa and Baie d'Ampio, about 6 miles south-south-eastward, is described on 50 page 263.

Baie d'Ampio, on the north-western side of Pointe Leviqui (Levique), is almost filled with the coastal reef.

*Charts 1116, 1002, 758, 2762.*



*Chart 1116.*

Baie d'Ambodivahibé, on the eastern side of Pointe Leviqui, is deep, and extends about  $2\frac{1}{2}$  miles south-south-westward; both sides of this inlet are fringed by the coastal reef. It is much frequented by small coasting vessels. A village, of the same name, is situated on the eastern side of the head of the bay.

*Charts 1054, plan of Baie de Rigny; 1116.*

Between Pointe Cornard, the inner eastern entrance point of Baie d'Ambodivahibé, and Pointe d'Ambodivahibé (*Lat.  $12^{\circ} 21' S.$ , Long.  $49^{\circ} 31' E.$* ), about 3 miles eastward, the coast is much indented, and is fronted by Banc d'Antala, a shallow coral bank extending as much as three-quarters of a mile offshore.

Pain de Sucre (page 261) in line with the southern fall of Massif de l'Ambongoabo, about 10 miles westward, leads northward of Banc d'Antala.

*Chart 1054, plan of Baie de Rigny.*

From Pointe d'Ambodivahibé the coast trends about  $2\frac{1}{2}$  miles south-eastward to Fausse passe (False pass), a narrow shallow channel separating the north-western end of Nosy Antendro from the mainland; Nosy Antendro, the south-eastern point of which is called Pointe Bigeault, extends about  $1\frac{1}{2}$  miles south-eastward, and attains an elevation of 101 feet ( $30m^8$ ); Pointe Bigeault is the northern entrance point of Baie de Rigny.

Baie d'Ankéríkika, which dries, lies between Nosy Antendro and the mainland westward; the village of Ankéríkika is situated on the western shore of this bay.

Banc du Nécessaire, fronting this part of the coast, extends about 2 miles offshore; on it are several coral heads and patches which dry. Ile Plate, 15 feet ( $4m^6$ ) high, lies on the north-western part of this bank, and Nosy Ampandrafitra, 8 feet ( $2m^4$ ) high, on its south-eastern part.

*Charts 1054, plan of Baie de Rigny; 1116.*

**Tidal streams.**—Between Baie de Rigny and Baie de Diégo-Suarez the tidal stream sets as follows, at springs: At low water, off Baie de Rigny, northward along the coast; abreast Baie d'Ambodivahibé, westward into the bay at a rate of about  $1\frac{1}{2}$  knots; one hour after low water, towards the coast and into Baie d'Ambodivahibé at a rate of  $1\frac{1}{2}$  knots; at half flood, along the coast towards the entrance to Baie de Diégo-Suarez with slack water in the entrance to Baie d'Ambodivahibé. At high water the stream is very weak all along the coast, but sets out of Baie d'Ambodivahibé at a rate of about half a knot; one hour after high water it sets southward, along the coast and out of Baie d'Ambodivahibé at a rate of about half a knot; at half ebb the streams are very weak, there is slack water in the entrance to Baie d'Ambodivahibé, and between that bay and Baie de Rigny it sets north-eastward at a rate of three-tenths of a knot.

*Chart 1054, plan of Baie de Rigny.*

**Current.**—During the greater part of the year the current off Baie de Rigny sets north-westward with great strength, but during the north-east monsoon a current of about half a knot has been found setting south-south-eastward at times.

*Chart 1116.*

**Anchorage.**—**Directions.**—Baie d'Ambodivahibé is scarcely safe for a large vessel. A good berth in this bay does not exist, and a suitable one for a short stay is difficult to find, as there are depths of

*Charts 1002, 758, 2762, 2899.*

*Chart 1116.*

26 fathoms (47<sup>m</sup>5) within a cable of the reef. Vessels wishing to anchor should send a boat in advance to buoy a suitable position.

*Charts 1116, 1002.*

A vessel approaching Baie d'Ambodivahibé from Baie de Diégo- 5  
Suarez should bring the summit of Ile Suarez (*Lat.* 12° 10' S., *Long.* 49° 24' E.) in line with Ambohibiri peak (page 259), bearing 315°, and steer south-eastward with this transit astern until Mont Antsahapano or Mont Egyptien, a pointed hill, 614 feet (187<sup>m</sup>1) high, about 3 miles south-south-westward of Ambodivahibé, bears 204°; Mont Antsaha- 10  
pano, bearing 204°, seen between Ankarakatova and Andraombé (page 261), leads up the bay.

*Charts 1054, plan of Baie de Rigny; 1116, 1002.*

From southward a vessel should pass about 1½ miles outside Pointe Ambodivahibé, and a good offing should be maintained until Mont 15  
Antsahapano bears 204°.

*Chart 1054, plan of Baie de Rigny.*

**Baie de Rigny.**—Baie de Rigny, the entrance to which lies between the southern side of Nosy Antendro and Pointe Sanson, about 3½ cables southward, extends about 2½ miles west-south-westward, and at the 20  
south-western end of this inlet a channel extends, between Pointe Mancel and Pointe Pintade, for a distance of about 1½ miles north-westward into Baie Francaise, a shallow lagoon; on the south-eastern side of Baie de Rigny are Baie d'Antsabé and Baie d'Amboulbouzekély, 25  
the greater part of which dry.

Two streams, Rivière Sankaze and Rivière Besok, flow into the south-western part of Baie Francaise.

The south-eastern side of Baie de Rigny is encumbered with reefs and shoals; the navigable channel is about 2½ cables wide.

*Charts 1054, plan of Baie de Rigny; 1002.*

Nosy Laliara, a round coral islet, 11 feet (3<sup>m</sup>4) high, over which the sea breaks, about half a mile east-south-eastward of Pointe Sanson, lies at the edge of the coastal reef, and assists in identifying the entrance; La Bosse, or Mont de Sable, 245 feet (74<sup>m</sup>7) high, about 1½ miles south-south-eastward of Pointe Sanson, together with Ankarakatova 35  
and Andraombé, also help to identify the position of this bay.

*Charts 1054, plan of Baie de Rigny; 758.*

**Directions.—Anchorage.**—A pyramid, standing on the southern extremity of Ile aux Huîtres, an islet, 32 feet (9<sup>m</sup>8) high, lying on the coastal reef about 7 cables west-north-westward of Pointe Sanson, in 40  
line with Ankarakatova, bearing about 268°, leads through the entrance to Baie de Rigny; it is best to keep rather on the northern side of the channel, the southern side of Nosy Antendro being nearly steep-to. When within the entrance, with Nosy Ambatomkéna, an islet, 9 feet (2<sup>m</sup>7) high, about 6½ cables west-south-westward of Pointe Sanson, 45  
bearing about 210°, a vessel should steer towards Pointe Mancel, which may be rounded at a distance of about half a cable.

*Chart 1054, plan of Baie de Rigny.*

There is anchorage in mid-channel, just above Pointe Mancel, in depths of from 6½ to 8 fathoms (11<sup>m</sup>9 to 14<sup>m</sup>6), mud. 50

*Chart 758.*

**Coast.**—The coast between Baie de Rigny and Baie de Loky, about 20 miles south-south-eastward, is but little known.

Iles Lowry (*Lat.* 12° 36' S., *Long.* 49° 36' E.), lying midway between

*Charts 1002, 758, 2762, 2899, 597.*

*Chart 758.*

these two bays and about three-quarters of a mile offshore, attain an elevation of 85 feet (25<sup>m</sup>9) ; about 3½ miles north-north-westward of Iles Lowry is the entrance to the shallow Baie d'Amboloboza, and close southward of these islands is the unexamined Baie du Rodo.

*Charts 679, plan of Loki bay ; 758.*

**Baie de Loky.—Islets and dangers.**—Baie de Loky is entered between Nosy Ankomba, the northern extremity of which is situated about 4 miles south-eastward of Iles Lowry, and Pointe Ambodilamoty, about 3½ miles east-south-eastward of Nosy Ankomba ; it is open northward, and extends about 7 miles south-south-westward. The village of Loky is situated on the north-western side of the bay, about 4½ miles southward of Nosy Ankomba, and Rivière de Loky flows into its head ; boats have ascended this river for 2 or 3 miles.

*15 Chart 679, plan of Loki bay.*

Nosy Ankomba is connected with the mainland southward by a reef which dries.

Between Pointe Ambodilamoty and Pointe Corail, about one mile westward, the coast is bordered by a coral reef, which dries and extends as far as 7 cables offshore ; Raymond islet, Ilot des Brisants, and Ilot Heron, lie on this reef.

A navigable channel, about 3 cables wide, leads into Baie de Loky, but some detached shoals, with a least depth of 10 feet (3<sup>m</sup>0) over them, the positions of which can best be seen on the plan, lie in the fairway.

**Directions.—Anchorages.**—From a position about one mile eastward of the southern extremity of Nosy Ankomba a vessel should steer south-south-westward, between the dangers on either hand, into Baie de Loky ; she should be coned from the masthead.

*30* Anchorage can be obtained in depths of from about 5 to 7½ fathoms (9<sup>m</sup>1 to 13<sup>m</sup>7), well sheltered from all winds, above Pointe Chron, a tongue of land about 2½ miles south-south-westward of Pointe Corail.

Southward of Loky there is a nearly landlocked basin affording anchorage to small vessels.

*35* It is advisable to mark the channel before attempting to approach these anchorages.

**Coast.**—Owen point is situated about one mile south-south-eastward of Raymond islet, and between this point and Pointe Antséránambé, about 1½ miles east-south-eastward, is Faux port, or Baie de Toky, which is completely filled with the coastal reef.

*Chart 679, plan of Mangerivi bay.*

**Baie de Mangerivy.**—Baie de Mangerivy, or Port Leven, which is only exposed to north-easterly winds, lies between Nosy Manambidy, which is situated on the coastal reef about one mile eastward of Pointe Antséránambé, and the mainland, on its western and southern sides, and a group of islands and islets lying within about 7 miles northward of Point Owen, a promontory 62 feet (18<sup>m</sup>9) high, situated about 9 miles south-eastward of Pointe Antséránambé, on its eastern side.

*50 Chart 679, plan of Mangerivi bay ; 758.*

Tsaramborona (*Lat.* 12° 57' S., *Long.* 49° 38' E.), Andraombé, and Ankarakatova, all described on page 261, are useful landmarks for identifying Baie de Mangerivy. At night, the light on Nosy Akao (*see below*) enables a vessel to identify the entrance.

*Charts 758, 2899, 597, 748a, 748b.*

*Chart 679, plan of Mangerivi bay.*

**Current.—Tidal streams.**—The general north-going current prevailing during the south-east monsoon is deflected by the islands off Baie de Mangerivy northward and north-eastward leaving between it and the coast a space occupied by an eddy or counter current of considerable strength setting southward or south-westward. This counter current might endanger vessels bound southward during the night and, its limits eastward being uncertain, caution must be observed when approaching and passing Barracouta islet, the easternmost of the group northward of Point Owen.

**Lights.**—A light is exhibited, at an elevation of 151 feet (46<sup>m</sup>0), from a concrete tower, 59 feet (18<sup>m</sup>0) in height, situated on the summit of Nosy Akao.

A light is exhibited, at an elevation of 56 feet (17<sup>m</sup>1), from a pylon, 23 feet (7<sup>m</sup>0) in height, situated on the northern end of Barracouta islet.

**Islands and dangers.**—Nosy Manambidy is dark and easily distinguished; it is low, partially wooded, and fringed by a coral reef. Several reefs and shoals lie within 1½ miles south-eastward of Nosy Manambidy.

The islands and islets northward of Point Owen are all low, covered with brushwood, and fringed by beaches of white sand; Nosy Akao, the largest of this group, is partially wooded; Ilot du Nord (North islet), the northernmost of this group, lying about 1½ miles north-eastward of Pointe de l'Observatoire, the northern extremity of Nosy Akao, is white, and can be seen from a distance; Barracouta islet is not easily distinguished.

Ilot Moury, which is wooded, lies on the coastal reef about half a mile south-eastward of Pointe de l'Artémise, a promontory 105 feet (32<sup>m</sup>0) high, which is situated about 3½ miles south-eastward of Pointe Antsérnanambé; Ilot Guy, barren and composed of black basalt, lies on the coastal reef about half a mile south-westward of Ilot Moury.

Ilot du Milieu (Middle islet), 9 feet (2<sup>m</sup>7) high, lying on the eastern side of the entrance channel, about one mile south-westward of the southern extremity of Nosy Akao, is wooded; Nosy Satrana, about 6 cables east-south-eastward of Ilot du Milieu, is 42 feet (12<sup>m</sup>8) high; Ilot Manampahana, about 1½ miles south-eastward of Nosy Satrana, has a sandy patch near its southern end; Ilots du Sud (Southern islets), lying on the coastal reef about one mile westward of Ilot Manampahana, are wooded.

Ilot aux Oiseaux lies on the coastal reef about midway between Ilot Guy and Point Owen (*Lat.* 12° 53' S., *Long.* 49° 51' E.).

Several shoals, with a least depth of 11 feet (3<sup>m</sup>4) over them, the positions of which can best be seen, on the plan, lie in the fairway; the fairway is about 6 cables wide in the entrance, but narrows farther within.

**Directions.—Anchorages.**—A vessel approaching Baie de Mangerivy must guard against the prevailing strong north-going current; as soon as the islands here are identified a vessel should steer with Pointe de l'Observatoire bearing 180° until Ilot Guy bears 204°, and is seen between Pointe de l'Artémise and Ilot Moury, when it should be steered for on that bearing. A vessel should anchor westward of Pointe de l'Observatoire, or Pointe de Sable, the south-western extremity of Nosy Akao, in depths of from 6 to 7½ fathoms (11<sup>m</sup>0 to 13<sup>m</sup>7), sand.

The south-eastern entrance, which lies between Ilot Manampahana

*Chart 679, plan of Mangerivi bay.*

and Ilots du Sud, is encumbered with shoals, and is almost impracticable; this passage should not be attempted except in case of necessity, and after having marked it.

- 5 A range of round-topped hummocks extends parallel to the coast from a position about  $3\frac{1}{2}$  miles west-north-westward of Point Owen to Cap du Diable, about  $1\frac{1}{2}$  miles south-eastward of the point.

- Landing is always possible at Pointe de Sable, but only at half-tide at Pointe de l'Observatoire; at half-tide lighters can proceed along off the beach eastward of Pointe de Sable and work cargo from the anchorage at its head. There are boat channels through the reef eastward of Nosy Akao, which permit communication with Barracouta islet.

*Chart 679, plan of Andravina bay.*

- Baie d'Andravina.**—Baie d'Andravina is entered between Cap du Diable and Pointe Berry, about 2 miles southward; the former point is the south-eastern extremity of the range of round-topped hummocks mentioned above, and the latter the northern termination of reddish level ground of moderate elevation. The Andravina, a small river, flows into the southern part of this bay.

- 20 A reef, above water and sunken, lies near the centre of this bay.

The bay is exposed to northerly and north-easterly winds, but in its south-eastern part there is shelter for small vessels from easterly winds.

*Charts 679, plan of Andravina bay; 758.*

- Tsaramborona, bearing about  $265^\circ$ , leads to the entrance to Baie d'Andravina.

*Chart 758.*

- Coast.—Islets.**—From Pointe Berry the coast trends about 26 miles south-south-eastward to the head of Baie de Vohémar; this part of the coast is but little known, and does not possess any sheltered anchorage.

From Pointe Berry to Cap Manambato, or Cap Triangulaire, about 16 miles southward, the coast consists of a sandy beach, with small whitish cliffs covered with scanty bushy vegetation.

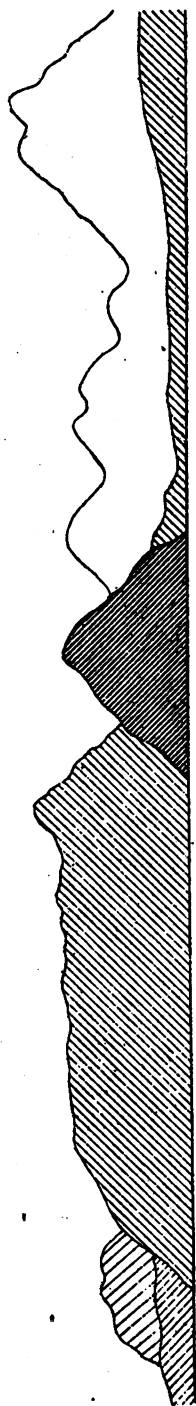
- Close off Cap Tanjona (*Lat.  $13^\circ 03' S.$ , Long.  $49^\circ 55' E.$* ), or Pointe aux Iles, about 7 miles south-south-eastward of Pointe Berry, are three islets lying in a northerly and southerly direction; these islets must not be confused with Trois Frères (Three Brothers), three islets about 2 miles farther southward. These islets are so close inshore that none of them can be distinguished from a distance.

- 40 Rivière Manambato, which flows into an inlet on the northern side of Cap Manambato, has a bar across its mouth, impassable even for boats; the mouth of this river can be identified from northward by a small white hill, but this is obscured from southward by Cap Manambato. The outer line of discoloured river water might easily be mistaken for a reef.

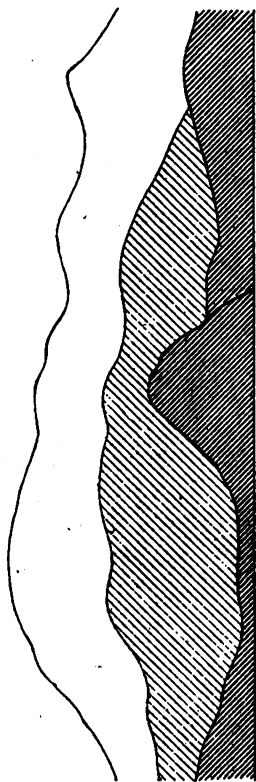
- Cap Manambato, 649 feet (197<sup>m</sup>8) high, which is a good landmark for vessels coming from northward and bound for Baie de Vohémar, is a massive triangular rock, which, on account of its dark colour, shows up well against the mountains inland, especially from eastward; it is steep-to. See views facing this page.

From a position about one mile south-south-eastward of Cap Manambato the coast is fringed by a reef, covered with mangroves; an islet lies close offshore where this reef commences, and there is here a gap in the reef affording shelter to small vessels with local knowledge; this

*Charts 758, 2899, 597, 748a, 748b.*



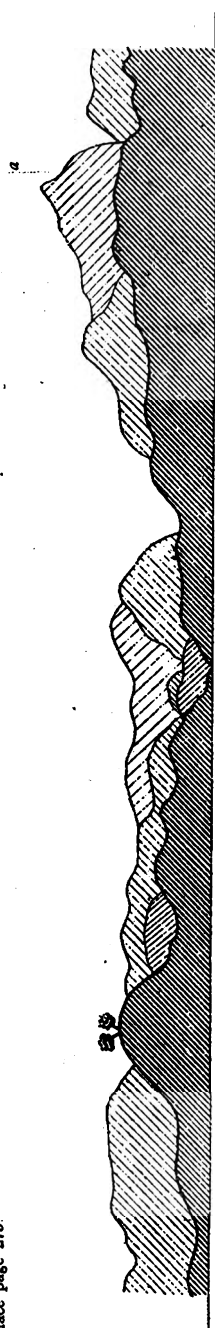
*Cape Masambato,  
bearing 190°  
distant 12 miles.*



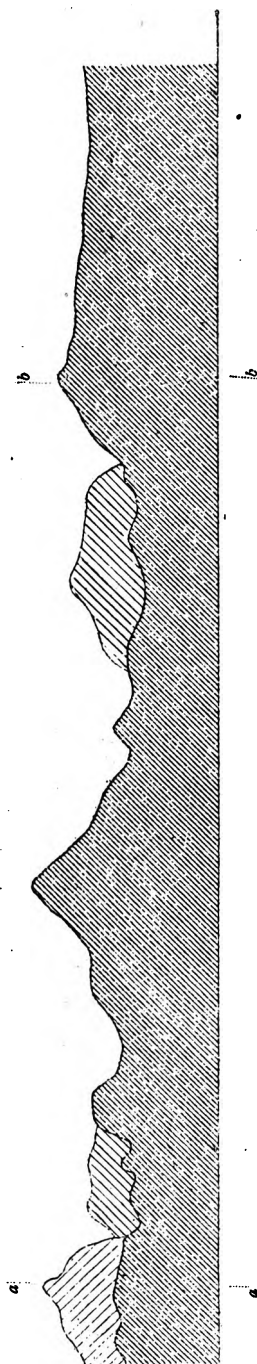
*Cape Masambato,  
bearing 270°  
distant 8 miles.*

Two views of approach to Baie de Vohémar.

(Originals dated prior to 1934.)

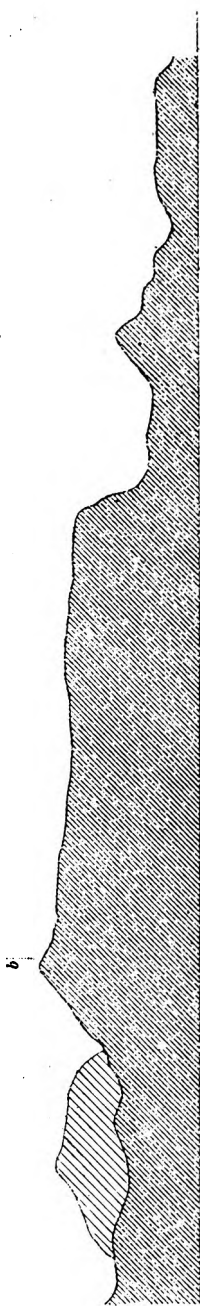


Conspicuous tree.



Conical hill.

Massif d' Antalaha, bearing 240°.



Massif d' Antalaha, bearing 240°.

View, in three parts, of approach to Rade d' Antalaha.  
(Original dated prior to 1934.)

*Chart 758.*

is the only accessible landing place between Cap Manambato and Baie de Vohémar.

About 2 miles southward of the islet mentioned above the coast ceases to be rocky, and becomes marshy. 5

Ile Verte (Green islet), 98 feet (29<sup>m</sup>9) high, is of a darkish colour, and lies at the edge of the coastal reef about 6 miles south-south-eastward of Cap Manambato.

*Chart 679, plan of Vohemar bay.*

**Baie de Vohémar.**—Baie de Vohémar is an inlet in the coastal 10 reef, lying between the entrance to Rivière Mantialaka (Mantialac), and Pointe Hiarambazaha (Vohemar point), the southern entrance point of the bay, about 2½ miles south-eastward; it is shallow, but affords good shelter to small vessels with local knowledge. The town of Vohémar is situated on the north-western side of Pointe Hiaram- 15 bazaha.

Coming from northward, Pointe Hiarambazaha, thickly covered with trees, and about 70 feet (21<sup>m</sup>3) high, will be seen between two high tablelands, of which the southern is the smallest; in front of the high lands are other hills, either of table or saddle form, situated from 1½ to 2 miles from the point. No part of the town is visible from seaward, and the whole western side of the bay up to the entrance to Rivière Mantialaka, is bordered by dense mangrove bush.

**Tidal streams.**—The streams follow the direction of the channel, and attain a rate of 1½ knots at springs. Inside, the flood stream is 25 deflected northward. The ebb stream outside turns north-north-eastward.

**Lights.—Beacons.** A light (*Lat. 13° 21' S., Long. 49° 58' E.*) is exhibited at an elevation of 203 feet (61<sup>m</sup>9) from No. 2 beacon, a pyramid, painted white with horizontal black bands, 20 feet (6<sup>m</sup>1) in 30 height, situated on the western side of the bay, close south-eastward of a 180-foot (54<sup>m</sup>9) hill, about 2½ miles westward of Pointe Hiarambazaha.

A light is occasionally exhibited at an elevation of 16 feet (4<sup>m</sup>9) from No. 3 beacon, a pyramid, painted in black and white horizontal 35 bands, situated at the south-western edge of the coastal reef on the northern side of the entrance channel, which lies a little northward of Pointe Hiarambazaha.

A light is occasionally exhibited at an elevation of 20 feet (6<sup>m</sup>1) from No. 4 beacon, painted black and surmounted by a cylinder, situated 40 at the north-western edge of the coastal reef on the southern side of the entrance channel.

A light is occasionally exhibited from a white post, 10 feet (3<sup>m</sup>0) in height, situated close westward of the Custom house, about 3 cables south-westward of Pointe Hiarambazaha. 45

No. 5 beacon, painted black and surmounted by a cylinder, stands at the north-eastern edge of the coastal reef on the southern side of the entrance channel, about 2 cables east-north-eastward of Pointe Hiarambazaha; this beacon was reported, in 1936, to be destroyed.

On a hill, 364 feet (110<sup>m</sup>9) high, about 2 miles south-westward of 50 Pointe Hiarambazaha, is a signal station, and near it stands No. 1 beacon, of masonry, 26 feet (8<sup>m</sup>0) in height, and painted white with a black vertical stripe.

**Buoy.**—A mooring buoy, from which a *white fixed* light is occasion-

*Charts 758, 2899, 597, 748a, 748b.*



*Chart 679, plan of Vohemar bay.*

ally exhibited, is moored off the pier, about one cable north-westward of the light close westward of the Custom house.

**Islets and dangers.**—The coastal reef northward of the entrance channel extends as much as  $2\frac{1}{2}$  miles offshore, and nearly covers at springs; the sea always breaks over this reef, and near its south-eastern end breaks in depths of 3 fathoms ( $5^m5$ ) more than one cable outside it.

Ilots Noirs (Black islets), a group of islets, the highest of which attains an elevation of 95 feet ( $29^m0$ ), lie near the edge of the coastal reef about  $1\frac{1}{2}$  miles northward of Pointe Hiarambazaha.

A stranded wreck, of which only a funnel was showing, in 1923, lies at the south-eastern edge of the coastal reef on the northern side of the entrance channel.

The coastal reef extends about 2 cables east-north-eastward of Pointe Hiarambazaha; this reef was reported, in 1931, to extend half a cable westward of No. 5 beacon.

**Caution.**—It was reported, in 1923, that extensive shoaling had taken place in Baie de Vohémar.

**Directions.**—The entrance channel is about one cable wide but, during strong south-easterly winds, it is difficult to distinguish, as the sea breaks right across it.

A vessel should approach with Nos. 2 and 3 light-beacons in line, bearing  $260^\circ$ , and round No. 4 light-beacon (*Lat.  $13^\circ 21'$  S., Long.  $50^\circ 00'$  E.*) at a distance of about a quarter of a cable, thence steering for No. 1 beacon, towards the anchorage. Care must be taken on account of the tidal streams setting northward not to reduce speed until westward of the stranded wreck.

The best time for entering, is at low water, when more of the dangers are visible also, the coastal reef northward of the entrance being uncovered, there is no set of the tidal stream across the channel; there is also the advantage of the vessel swinging to the rising tide when anchoring.

It is essential that a vessel should keep on the leading line, guarding against the tidal streams, which are often strong, setting across the channel, on account of the dangers on either side being very close to the leading line.

**Anchorage.**—There is anchorage for vessels drawing not more than 19 feet ( $5^m8$ ), in depths of 8 fathoms ( $14^m6$ ), about one cable  $325^\circ$  from the flagstaff standing on the coast half a cable east-north-eastward of the light close westward of the Custom house; vessels should anchor with  $1\frac{1}{2}$  to 2 shackles of cable, and secure their sterns by two stern-fasts, one to the pier and one to the buoy, but this is difficult with the ebb stream.

Long vessels should lie further offshore, and moor in depths of 11 fathoms ( $20^m1$ ).

A boat channel leads from the anchorage to the mouth of Rivière Mantialaka.

**Pier.**—A wooden pier projects from the coast, in front of the Custom house.

**Port limits.**—The limits of the port are as follows:—

On the east: a line drawn from beacon No. 4 in a  $327^\circ$  direction to the high water line, and in an  $000^\circ$  direction to the edge of the reef.

On the west: a line drawn from beacon No. 3 in a  $180^\circ$  direction to the high water line.

*Charts 758, 2899, 597.*

*Chart 679, plan of Vohémar bay.*

On the north and the south : the edge of the reef, and the high water line, respectively, between the eastern and western limits.

**Town.**—The town of Vohémar is the capital of the province of that name ; it is considered to be fairly healthy, the climatic diseases are malaria and dysentery. 5

There is an important trade in cattle.

Fresh provisions are obtainable. There are some water-boats, by means of which 100 tons of water can be put onboard.

**Communications.**—There is regular steamer communication with 10 other Madagascan ports. The town is connected with the general telegraph system.

**Signal station.**—**Storm signals.**—There is a signal station, with which vessels can communicate by day ; it is situated near the coast about 3 cables south-westward of Pointe Hiarambazaha. 15

Signals indicating the locality threatened by a cyclone are displayed at Vohémar. See page 27.

*Chart 758.*

**Coast.**—**Aspect.**—**Dangers.**—Between Pointe Hiarambazaha (*Lat. 13° 21' S., Long. 50° 01' E.*) and Sambava, about 56 miles southward, 20 the coast has some slight indentations.

The general aspect of the coast between Pointe Hiarambazaha and the parallel of 14° S. is the same as that farther northward. In the background are high mountains of steep rocky appearance, and nearer are mountain ranges gradually diminishing in elevation the closer 25 they approach the coast, with which they are parallel ; these mountains and hills are mostly bare and of a reddish aspect. The vast open plains, yellow and dried up during the south-east monsoon, are green during the rainy season, and have a scanty growth of shrubs and trees in the ravines and sheltered places, and of brushwood, where it is not rocky, 30 near the coast.

These characteristics are in marked contrast to the appearance of Vohémar, and also to the coast southward of the parallel of 14° S., where an unbroken sandy beach fronts a thickly-wooded country ; for here begin thick forests covering all the country and continuing with 35 but slight interruption, as far as Cap Est (Cape East), about 63 miles south-south-eastward of Sambava. On this long stretch of coast conspicuous points are not lacking, but some are only approximately correct as regards longitude.

About 6 miles southward of Pointe Hiarambazaha is the mouth of 40 Rivière Manambéry (Manambéro), and about 3 miles farther southward a small river flows into the sea ; the village of Fanambana is situated on the southern side of the mouth of the latter river. Between these two rivers, and close to the coast, stands Morne Noir, a conical hill, 344 feet (104<sup>m</sup>8) high, very conspicuous from southward though seen 45 against a background of flat-topped hills higher than itself and, from its black, bare, and rocky appearance, contrasting strongly with its surroundings of green and yellow, according to the season.

Cap des Gouffres, about 6 miles south-eastward of Morne Noir, is a high steep cliff, against which the sea breaks ; it is fringed by detached 50 rocks extending about one mile offshore.

Cap Anorontany, about 5 miles south-south-eastward of Cap des Gouffres, is a precipitous bluff of some elevation, fringed by rocks extending about one mile offshore.

*Charts 758, 2899, 597, 748a, 748b.*

*Chart 758.*

Anse de Bonne Tenue, on the northern side of Cap Anorontany, can be identified by a small isolated sugarloaf hill which, seen from southward, stands out clear of the cape; it is very doubtful whether this bay affords shelter, as the swell causes a heavy surf.

Rivière Ampanobé (Fanambana) flows into the sea on the southern side of Cap Anorontany.

The coast between Cap Anorontany and the mouth of Rivière Mahataingina (Matainga), about 6 miles southward, is high and rocky, while southward of this river it is low and wooded and the country is green.

The coast for a distance of about 13 miles southward of Cap Anorontany (*Lat. 13° 40' S., Long. 50° 07' E.*) is fringed by a reef extending as far as one mile offshore.

Baie de Mahanara, a slight indentation about 12 miles southward of the mouth of Rivière Mahataingina and on the northern side of Cap Mahanara, is easily identified by the depression formed by the valley of the river of the same name, and which is the only valley of this nature on this part of the coast.

Morne de Mahanara, a low isolated hill about 12 miles west-north-westward of the mouth of the river, is very conspicuous on account of its appearance and dark colour; from north-eastward it has the appearance of a truncated sugarloaf, while from south-eastward it appears wedge-shaped. It is a good landmark for a vessel making Sambava from northward. A little southward and behind Morne de Mahanara is a conspicuous gap which must not be confused with that just westward of Piton de Sambirano, about 11 miles south-south-westward.

Pointe Sambirano, about 9 miles south-south-eastward of the entrance to Rivière de Mahanara, is fringed by a reef over which the sea breaks heavily; the greenish colour of the water over this reef clearly indicates its limits.

Piton de Sambirano is higher than any of the surrounding hills and is often hidden by clouds; when approaching, in clear weather, from north-eastward, a little distance south-eastward of this peak will be seen a lower hill with a large notch, and another smaller notch below it, which are conspicuous from northward.

The shallow Rivière Bemarivo, bordered by plantations of vanilla and coffee, flows into the sea about midway between Cap Mahanara and Sambava.

A reef, extending as far as  $1\frac{1}{4}$  miles offshore, fringes the coast for a distance of 5 miles south-south-eastward of Sambava; Lac d'Andohabe lies just within this part of the coast.

A shoal, with a depth of  $5\frac{1}{4}$  fathoms ( $10^m$ ), coral, over it, the position of which is doubtful, was reported, in 1935, to lie about 13 miles south-south-eastward of Sambava and 3 miles offshore.

Massif d'Antalaha (Mount Ambanitazana), or Mont de la Table, situated about 26 miles southward of Sambava, is massive, perfectly circular, and may be seen from a distance seaward of about 40 miles; it appears to be on the coast, though really it is about 3 miles inland, the intervening land being low. Fausse Table, about 16 miles northward of Massif d'Antalaha, is a hill of less regular shape and may be mistaken for Massif d'Antalaha; in clear weather both will be seen at the same time, but in heavy weather the mistake is easy to make.

*Charts 2899, 597, 748a, 748b.*

*Chart 758.*

About 2 miles south-south-eastward of Massif d'Antalaha stands a bare conical hill.

See view facing page 275.

The small town of Antalaha is situated on the coast about  $11\frac{1}{2}$  miles south-south-eastward of the conical hill mentioned above.

**Anchoragees. — Dangers. — Beacons. — Directions.** — Vessels can obtain anchorage about one mile off the mouth of Rivière Ampanobé in depths of 9 fathoms ( $16^m5$ ), sand and mud, with Cap des Gouffres (Lat.  $13^{\circ} 34' S.$ , Long.  $50^{\circ} 05' E.$ ) bearing  $329^{\circ}$ .

*Charts 679, plan of Sambava anchorage; 758.*

The roadstead at Sambava is situated off the mouth of Rivière de Sambava; this river forms a lagoon at its mouth, and the village of Sambava is situated on a promontory which forms the eastern side of the lagoon.

Approaching this roadstead from northward Morne de Mahanara is the best landmark, and Massif d'Antalaha if coming from southward.

A wooded elevation overlooks the village, among the huts of which are some with red corrugated iron roofs visible from a distance of about 8 miles seaward. Coming from southward the village is not visible until on its parallel.

Two rocky patches, the north-western with a least depth of 22 feet ( $6^m7$ ) over it, and the south-eastern with a least depth of 18 feet ( $5^m5$ ), lie close together in the middle of the roadstead about 6 cables north-eastward of the eastern entrance point of the river; the sea breaks over these patches with a heavy swell.

Two prism-shaped beacons, painted white, the front one standing on the coast about one mile north-westward of the eastern entrance point of the river, and the rear one situated on a hillock west-north-westward of the front beacon, when in line, bearing  $284^{\circ}$ , lead southward of the rocky patches; two beacons, painted in black and white horizontal bands, about 6 cables apart, the front one standing on the northern extremity of the eastern entrance point of the river, and the rear one on the wooded elevation overlooking the village, when in line, bearing  $196^{\circ}$ , lead westward of these rocky patches.

A vessel bound for the anchorage off Sambava must approach it from northward, and should steer for the anchorage with the black and white beacons in line, bearing  $196^{\circ}$ , which leads to an anchorage in depths of  $7\frac{1}{2}$  fathoms ( $13^m7$ ), muddy sand, but the holding ground should not be relied on; if coming from southward a vessel should give the coast a wide berth until Piton de Sambirano bears  $275^{\circ}$ , when course can be altered towards Sambava as directed above.

Small vessels, drawing not more than 13 feet ( $4^m0$ ), can obtain anchorage, in depths of from  $6\frac{1}{2}$  to  $7\frac{1}{2}$  fathoms ( $11^m9$  to  $13^m7$ ), south-westward of the rocky patches described above and about 5 cables from the mouth of the river, with Pointe Ampandrozono, a low point about  $1\frac{1}{4}$  miles east-south-eastward of the eastern entrance point of the river, bearing  $133^{\circ}$ , and a house with a red roof bearing between  $190^{\circ}$  and  $205^{\circ}$ . Caution is necessary when making this anchorage.

This roadstead is impracticable with fresh south-easterly winds, which frequently blow in the afternoon during the south-east monsoon, i.e. from April to October; the best time of the year for anchoring here is between November and April.

*Charts 2899, 597, 748a, 748b.*

*Charts 679, plan of Sambava anchorage; 758.*

**Sambava.**—Sambava (*Lat. 14° 16' S., Long. 50° 12' E.*) is connected with the general telegraph system of Madagascar. The Messageries Maritimes vessels call here regularly, and there is occasional steamer communication with the other ports of Madagascar.

Fresh provisions can only be obtained from places inland; fish is plentiful.

Several lighters are available.

The chief export is vanilla.

*10 Charts 769, plan of Antalaha road; 758.*

**Rade d'Antalaha.**—**Light.**—The peak of Antalaha and the houses of the town are visible from a distance of about a dozen miles seaward and, in clear weather, are excellent marks for identifying this anchorage; they show up especially well at sunrise. Northward of the town stand *15* two conspicuous isolated trees (*see view facing page 275*) on the summit of a hill; a house, with a white roof, standing about  $8\frac{1}{2}$  cables south-eastward of the peak of Antalaha, is conspicuous from north-eastward. The reef which fringes the coast at Antalaha is visible from seaward.

*20* If desirous of communicating with the shore it is best to wait for a native boat to come off.

A pier, from which a light is occasionally exhibited from a gallows, 10 feet (3<sup>m</sup>0) in height, projects from the shore fronting the town, near the Customs house.

*25* **Beacons.**—Two pairs of beacons, one situated on the north-western side of the village and the other about three-quarters of a mile south-eastward of the village, when in line, bear 277° and 207°, respectively. The north-western pair consists of white conical beacons, each surmounted by a white staff, 5 feet (1<sup>m</sup>5) in height; the south-eastern pair *30* consists of conical beacons, painted in black and white horizontal bands, the front beacon surmounted by a white staff and the rear beacon by a black staff, each 5 feet (1<sup>m</sup>5) in height.

**Anchorage.** — **Directions.** — **Shoals.** — Rade d' Antalaha is entirely open and only fit for fine weather. The best berth is, in depths *35* of 10 fathoms (18<sup>m</sup>3), about a mile eastward of the village, at the intersection of the alignments of the two pairs of beacons. This anchorage is only practicable from October to April, which is the season for cyclones, to which it is particularly exposed.

The beacons in line, bearing 207°, lead over a shoal, with a least depth *40* of 33 feet (10<sup>m</sup>1), lying about  $1\frac{1}{2}$  miles east-north-eastward of the light on the head of the pier; another shoal, with a least depth of 32 feet (9<sup>m</sup>8) over it, lies about one cable south-south-eastward of the former shoal.

The bare conical hill, 2 miles south-south-eastward of Massif *45* d'Antalaha, in line with the south-western declivity of the latter mountain, bearing about 331°, leads from southward a little north-eastward of Antalaha. *See view facing page 275.*

**Port limits.**—The limits of the port (*Lat. 14° 51' S., Long. 50° 19' E.*) are as follows:—

*50* From a position on the high water line 180°, distant about one cable from the light on the head of the pier, a line drawn, through the light, in an 000° direction for a distance of about  $10\frac{1}{2}$  cables, thence in an 090° direction for about  $18\frac{1}{2}$  cables, thence in a 180° direction for about 19 cables, thence in a 270° direction for about  $5\frac{1}{2}$  cables, and thence

*Charts 758, 2899, 597, 748a, 748b.*

*Charts 679, plan of Antalaha road ; 758.*

in a 300° direction for about 13 cables to the high water line in a position about 145° distant 3½ cables from the light on the pier head.

**Signal station.—Storm signals.**—There is a signal station near 5 the Custom house, with which vessels can communicate.

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed.

**Communication.**—There is regular steamer communication with the other Madagascan ports. Antalaha is connected with the general 10 telegraph system of Madagascar.

**Trade.**—Vanilla is the principal export. Lighters are available. *Chart 758.*

**Coast.—Aspect.—Dangers.**—From Antalaha the coast trends about 8 miles south-south-eastward to Cap Tsihananina. 15

A group of detached rocks, rising to some elevation, fringes this cape ; there is no passage inside these rocks. A sunken ledge extends not less than one mile seaward under water, and the cape should be given a wide berth.

*Charts 679, plan of Angontsy road ; 758.* 20

From Cap Tsihananina the coast trends about 16 miles south-south-eastward to Cap Est, the southern entrance point of Rade d'Angontsy, also the eastern extremity of Madagascar, and is fringed in places by a reef ; the village of Angontsy is situated at the northern end of Cap Est. 25

Rivière Ony Bé (Ngabé, Anonibé, or Great river) flows into the sea on the southern side of the northern entrance point of Rade d'Angontsy, about 2 miles north-north-westward of Cap Est ; it is shallow, and the entrance is obstructed by a reef. The village of Anonibé is situated on a sandy projection on the southern side of the entrance to this river ; 30 it is difficult to distinguish from the offing.

Cap Est is a low sandy point, inland of which are some wooded hillocks ; it is bordered by reefs extending as much as one mile offshore, beyond which it is reported to be free from dangers.

Nosy Angontsy, lying on the coastal reef about 2 cables eastward of 35 Cap Est, is low-lying, flat, and covered with vegetation of a lighter colour than that on the mainland ; this circumstance helps to identify the locality, though it cannot be seen until after the hummocks on the mainland, and never appears detached from the coast until the vessel is entering Rade d'Angontsy. 40

Pitons d'Angontsy (*Lat. 15° 17' S., Long. 50° 18' E.*), or Pitons d'Antalaha (Ngontsi peaks), situated about 10 miles inland westward of Rade d'Angontsy, consist of three summits like the teeth of a saw, and a fourth separated from the others by a U-shaped gap ; from north-eastward this mountain appears to have only two summits. 45

**Current.**—The current is very strong off Cap Est, especially during the south-east monsoon. Approaching the coast from southward or south-eastward, it sets northward or north-eastward near the projecting land, and a counter current, the limit of which is uncertain, is formed opposite the receding coastline northward. During hazy weather, or 50 at night, a vessel should keep a good offing so as to avoid this counter current.

**Light.**—A light is exhibited at an elevation of 229 feet (69<sup>m</sup>8) from a white iron tower on a masonry base, 62 feet (18<sup>m</sup>9) in height,

*Charts 2899, 597, 748a, 748b.*

*Charts 679, plan of Angontsi road ; 758.*

situated about  $1\frac{1}{2}$  miles south-south-westward of the village of Angontsy and one cable inland.

**Rade d'Angontsy. — Directions. — Anchorage.** — Rade d'Angontsy, the entrance to which is about 7 cables wide through a gap in the coastal reef, is well sheltered except for winds from north-east, and affords anchorage to vessels drawing not more than 19 feet ( $5^m8$ ). The coastal reef is plainly visible and steep-to; there are several dangerous narrow openings in this reef, where the sea breaks heavily, but none of these can be mistaken for the entrance to Rade d'Angontsy.

Cap Est light-tower, bearing about  $193^\circ$ , leads through the gap in the coastal reef to the anchorage; vessels should anchor slightly westward of this line, with Nosy Angontsy bearing about  $144^\circ$  and open a little north-eastward of the northern extremity of Cap Est, in depths of from  $5\frac{1}{2}$  to  $6\frac{1}{2}$  fathoms ( $10^m1$  to  $11^m9$ ). During the south-east monsoon, i.e. from April to October, the south-eastern part of the roadstead is the safest. Landing is not difficult.

Cattle are procurable.

20 *Chart 758.*

**Coast.—Aspect.—Dangers.**—From Cap Est the coast trends about 45 miles south-south-westward to Cap Masoala; from Cap Est to the entrance to Baie Vinambé, about 36 miles south-south-westward, it is very uniform and affords no anchorage, except near Nosy Ambatonifanga, an islet lying close offshore about 20 miles south-south-westward of Cap Est, where there is a small port, not yet properly surveyed, which is reported to be a good one and frequented by coasters. The first part of this coast consists of a series of wooded hills parallel with, and declining rapidly to, the coast, and forming occasional cliffs interrupted by long sandy beaches. Behind rise a succession of high hills, covered with trees, undulating, and very uniform in appearance. This part of the coast is bordered by a reef extending from one to 2 miles offshore, and reported to be wider than at any other part of the eastern coast of Madagascar; it is wider near Cap Est (*Lat.  $15^\circ 17' S.$ , Long.  $50^\circ 29' E.$* ) than towards Cap Masoala; it is everywhere steep-to.

A coral shoal, with a depth of  $3\frac{1}{2}$  fathoms ( $6^m9$ ) over it, the position of which is doubtful, was reported, in 1938, to lie about 10 miles south-eastward of Cap Est light-tower and 6 miles offshore.

40 From the mouth of Rivière Ampano, which flows into the sea about  $2\frac{1}{2}$  miles northward of Nosy Ambatonifanga, the coast is generally speaking low, backed here and there with wooded hills.

Cap Tanjona, about 5 miles southward of Nosy Ambatonifanga, is a wooded point projecting slightly, and fringed by a line of breakers.

45 Nosy Ambatoharana is a conspicuous low wooded islet lying about  $2\frac{1}{2}$  miles south-westward of Cap Tanjona; it lies about 2 cables north-eastward of Cap Piccolo, the southern entrance point of Baie d'Ambakaka, a small shallow bay, which is entered through a gap in the coastal reef, and affords anchorage to small craft with local knowledge. A wooded hill, standing on the second ridge (*see above*), when seen from north-eastward, presents an appearance like the shell of a turtle; it is situated in the neighbourhood of Nosy Ambatoharana, and from south-eastward appears as a long ridge running inland.

Rivière Vinanivao (Vavanirangi) flows into the sea through a sandy

*Charts 2899, 597, 748a, 748b.*

*Chart 758.*

mouth, on the south-western side of Cap Tanjodaingo, a promontory about 4 miles south-south-westward of Cap Piccolo.

About 2 miles south-south-westward of Cap Tanjodaingo, a wooded islet, about 131 feet (39<sup>m</sup>9) high, lies close offshore ; it has two rounded hummocks which stand out clearly from the coast. 5

About 4 miles south-westward of this wooded islet the coast forms Baie Vinambé, the entrance to which is encumbered with reefs.

Cap Masoala is high, wooded, and easily identified. Nosy Nepato lies close eastward of the point ; it is low and wooded. Northward of this islet is a patch of reef, which dries, over which the sea breaks. 10

Nosy Nepato is easily identified when open of the land, and when not open the vegetation on the island shows up darker than that on the mainland.

From Cap Masoala the coast trends about 4 miles westward to Cap Baldrisy, the eastern entrance point of Baie d'Antongil, and is fringed by a reef which extends as far as one mile offshore, and is steep-to ; it can be passed close to, in fine weather, following the reef by eye. 15

Cap Baldrisy consists of a tongue of low land, which is not easily distinguished. 20

Iles Behentona, a group of rocky islets, extend close south-westward of Cap Baldrisy ; the largest of these islets is low, sandy, light-coloured, partly covered with trees, and shows up well against the coast ; the southernmost islet is very black.

**Current.**—The current sets rapidly round Cap Masoala and Cap Baldrisy (*Lat. 15° 59' S., Long. 50° 09' E.*) into Baie d'Antongil during the south-east monsoon, attaining a rate of one knot at springs ; at that season vessels are cautioned to give these capes a wide berth, especially at night. 25

*Charts 758, 759b.*

**BAIE D'ANTONGIL.—Aspect.—Beacon.**—Baie d'Antongil is entered between Cap Baldrisy and Cap Bellone, about 22 miles south-westward, and extends about 40 miles north-north-westward. 30

Cap Bellone, a high rounded mass of rocks, which is visible from a distance of 40 miles in clear weather, is the northern termination of a mountain range which extends along the coast for about 75 miles in a south-south-westerly direction ; it is fringed by a reef, awash. A beacon, consisting of two square shapes, stands on the summit of this cape, close to a tall mango tree. It was reported, in 1916, that this cape lies farther eastward than charted. 40

On all sides the bay is enclosed by high mountains covered with forests. Those on the eastern side are uneven, and are detached branches of a central chain, which decline to the shore in very remarkable long slopes, leaving deep valleys between them ; those on the western side are uniform in elevation and shape, and form a wall running parallel with the coast. The land at the head of the bay is low ; the two mountain ranges forming the sides continue to run northward converging towards each other, and ultimately join, leaving a thickly wooded plain about a dozen miles wide between them and the coast. 50

There are moderate depths throughout the bay, decreasing towards its head. A few rocks, mostly above water, lie close offshore in many places ; those which are covered are easily seen from aloft.

*Charts 2899, 597, 748a, 748b.*



*Charts 758, 759b.*

Anchorage may be taken up almost anywhere in the bay, but the eastern side is the most sheltered; the best anchorage is at Maroantsetra (Port Choiseul) at the head of the bay.

- 5 The swell which is so heavy on the coast generally during August and September is felt at the anchorages, and sometimes breaks all round the inner shores of the bay.

**Current.**—During the south-east monsoon a surface current flows into Baie d'Antongil continuously, and generally with some strength; 10 it has been found to attain a rate of over a knot during the ebb stream at spring tides; this strong indraught should not be lost sight of by vessels approaching or passing the bay. See also pages 14 and 283.

*Chart 758.*

**Eastern side.—Dangers.—Beacon.**—The village of Ankarafotsy 15 is situated on the coast about 13 miles north-north-westward of Cap Baldrisy. Rivière Ankarafotsy, the entrance to which is encumbered by numerous rocks, flows into the bay here; a conspicuous rock, 30 or 40 feet (9<sup>m</sup>1 or 12<sup>m</sup>2) high, its flat summit covered with verdure, lies about 4 cables southward of the river mouth.

- 20 The village of Antalavia, with a large mango tree in it, is situated on the north-western side of a river of the same name about 4 miles north-westward of Ankarafotsy (*Lat. 15° 48' S., Long. 50° 03' E.*). A small beach of yellow sand lies on the northern side of the mouth of Rivière Sahalémy, about half a mile southward of Antalavia.

- 25 Pointe Tampolo, about 3 miles north-westward of Antalavia, can be identified by its being low-lying while the other points on the coast are high; the village of Tampolo is on the northern side of this point, and Rivière Tampaoly flows into the sea on the northern side of the village.

Anse de Tampolo (Port Salvatore), the north-eastern shore of which 30 is fringed by rocks, is entered between Antalavia and Pointe Tampolo, and can be identified by a small bare extension of the coast which shows up against the neighbouring forest; a small wooden pier projects from the coast, and there is a beacon, painted in black and white horizontal bands.

- 35 The village of Ambodiforatra (Benjana) is situated about 4 miles northward of Tampolo, on the shore of a small bay.

The Ambanizana river flows into the bay about 1½ miles north-north-westward of Ambodiforatra.

*Charts 758, 759b.*

- 40 **Directions.—Anchorage.—Beacon.**—Caution is necessary when navigating in Baie d'Antongil as the chart is not exact, and there may be abnormal magnetic variation. In clear weather entrance is easy as the landmarks are easily identified.

A vessel coming from northward should not usually attempt to enter 45 the bay at night from that direction on account of the strong current and absence of landmarks on the coast northward; she can, however, steer farther southward, until sighting the light on Pointe Albrand about 29 miles south-south-eastward of Cap Bellone, and then alter course for the bay.

- 50 On a clear night there is no difficulty in rounding Cap Masoala, as the coast and breakers can be seen; the eastern side of Baie d'Antongil shows up well by night.

A vessel coming from southward can pass on either side of Ile Sainte-Marie; when northward of the light on Pointe Albrand, near the

*Charts 2899, 597, 748a, 748b.*

*Charts 758, 759b.*

northern end of this island, course may be shaped for the entrance to Baie d'Antongil.

*Chart 758.*

Vessels with local knowledge can obtain anchorage in depths of 16 fathoms (29<sup>m</sup>3) about 4 cables westward of the entrance to Rivière Ankafotsy; the depths decrease rapidly towards the shore.

A vessel approaching Antalavia from southward should bring the village to bear 045° and steer for it on that bearing, and anchor in depths of 10 fathoms (18<sup>m</sup>3), fine yellow sand, with the large mango tree in the village bearing 045° and the mouth of the River Sahalémy 135°. A vessel approaching from northward should give the coast a berth of at least 1½ miles. This anchorage is encumbered with rocks, and when a vessel is expected a boat with a flag is moored on the rock nearest the berth where she should anchor.

Anse de Tampolo affords anchorage in depths of 16 fathoms (29<sup>m</sup>3), very soft mud, about 4½ cables westward of the pier, with Nosy Milomboka (*Lat. 15° 36' S., Long. 49° 51' E.*), which is situated 8 miles westward of Ambodiforatra, bearing 314°.

The *Antarès*, in 1932, anchored off Ambodiforatra in depths of 7 fathoms (12<sup>m</sup>8) with the village bearing 060°, the fall of the land southward bearing 191°, and the mouth of the river northward of the village bearing 020°. A sandbank, which extends seaward from the mouth of the river, must be avoided, but the *Antarès* approaching this anchorage on an easterly course found depths of not less than 7 fathoms (12<sup>m</sup>8). Some poultry may be obtained in the village.

Anchorage, in a depth of about 4 fathoms (7<sup>m</sup>3), may be obtained about 5 cables north-westward of the mouth of the Ambanizana river. There is a beacon on the coast about 3½ cables north-north-westward of the northern entrance point to this river; a vessel should approach the anchorage with this beacon in line with a 3,248-foot (990<sup>m</sup>0) summit, about 3 miles east-north-eastward of it, bearing 068°, and anchor when the point, situated about 2 miles west-north-westward of the beacon, bears about 301°.

*Charts 758, 759b.***Western side.—Islets and dangers.—Landmarks.—Beacons.**

—Cap Amorona, the southern entrance point of Baie Mananara, about 4 miles north-westward of Cap Bellone, is fringed by a reef, over which the sea does not always break; this cape should be given a berth of about 5 miles.

*Charts 679, plan of Mananara anchorage; 758, 759b.*

Baie Mananara, into which Mananara rivière flows from westward, can be identified by a wedge-shaped tongue of land extending in an east-north-easterly direction from the coast about 3 miles westward of Cap Amorona; the western and higher part of this tongue of land is darker than the rest of the coast; the eastern extremity of this tongue is named Pointe Ambitsika.

The Residency at Mananara, situated on a hill, 120 feet (36<sup>m</sup>6) high, about 6 miles westward of Cap Amorona, Mahambolona, a bare conical hill, 139 feet (42<sup>m</sup>4) high, about half a mile south-eastward of the Residency, and the beacon on Ilot Rocheux, about 1½ miles north-westward of the Residency, are conspicuous landmarks; a white beacon stands on Mahambolona.

Pic Manenarivo, an isolated sugarloaf hill, situated west-north-

*Charts 2897, 597, 748a, 748b.*

*Charts 679, plan of Mananara anchorage; 758, 759b.*

westward of Mananara, is not visible when bearing more than  $283^{\circ}$ ; it is not shown on the chart.

Ile aux Mouettes, lying about one mile east-north-eastward of the entrance to Mananara rivière and 2 cables offshore, is 28 feet ( $8^m5$ ) high; a one-fathom ( $1^m8$ ) patch lies about  $2\frac{1}{2}$  cables west-north-westward of Ile aux Mouettes. A reef, with a least depth of 11 feet ( $3^m4$ ) over it, about 5 cables north-north-eastward of Ile aux Mouettes (*Lat.*  $16^{\circ} 09' S.$ , *Long.*  $49^{\circ} 45' E.$ ), has uneven depths around it; this reef scarcely shows in calm weather, but the sea breaks heavily over it during south-easterly winds; a shoal, with a least depth of 31 feet ( $9^m4$ ), lies about  $2\frac{1}{2}$  cables west-north-westward of the north-western extremity of the reef.

A small beacon, called Beacon B, stands on the coast about 3 cables south-south-westward of Ile aux Mouettes.

Ilot Rocheux, lying in the centre of the mouth of Mananara rivière, has a small white wall on it.

The village of Mananara lies mainly on the eastern side of the river. The river is navigable for boats for at least 4 miles, but local knowledge is necessary; natives in surf boats come off to vessels anchoring here.

*Charts 758, 759b.*

The coastal reef fringes the western side of Baie d'Antongil for a distance of about 7 miles northward of Baie Mananara.

Between the entrance to Mananara rivière and Cap Tanjona, a promontory about 15 miles northward, the coast is fringed by numerous black rocks, always easily seen; a chain of black rocks several of which are awash and over which the sea breaks, extends about 3 cables eastward and north-eastward of Cap Tanjona.

*Charts 679, plan of Mananara anchorage; 758, 759b.*

**30 Directions.—Anchorages.—Beacons.**—A vessel approaching Mananara anchorage from east-north-eastward, having rounded Cap Masoala and Cap Baldrisy, should steer for Pic Manenarivo (pages 285-286) until the small white wall on Ilot Rocheux is in line with a pyramidal beacon, painted in black and white horizontal bands, in the centre of a clump of large trees which is difficult to identify, standing on Ambatomanan-Sandroka, a mountain, 1,409 feet ( $429^m5$ ) high, situated about  $4\frac{1}{2}$  miles south-south-westward of Ilot Rocheux, bearing  $210^{\circ}$ ; this pair of leading marks should be steered for on that bearing until a large tree, isolated and appearing white, situated on the coast southward of Ile aux Mouettes, is in line with the white beacon on Mahambolona hill, bearing  $154^{\circ}$ . The intersection of these two pairs of leading marks indicates the anchorage, which is in depths of from 7 to 8 fathoms ( $12^m8$  to  $14^m6$ ), hard sand.

A vessel coming from south-eastward should pass about 5 miles off Cap Bellone, and steer a north-north-westerly course until Pic Manenarivo is on a westerly bearing, when she should proceed as directed above.

A vessel coming from the head of the bay should, after passing Cap Tanjona, steer for Cap Bellone until the first pair of leading marks come into line when she should proceed as previously directed.

*Chart 679, plan of Approaches to Maroantsetra.*

**Head of bay.—Beacons.—Landmarks.—Islands and dangers.**

—Two beacons are situated at the head of the bay, westward of the signal station at Maroantsetra (*see below*); the front beacon, standing

*Charts 758, 2899, 597, 748a, 748b.*

*Chart 679, plan of Approaches to Maroantsetra.*

on the coast, consists of a white triangular shape, and the rear beacon, about one cable north-eastward of the front beacon, of a white rectangular shape. These beacons, when in line, bear 037°. A vessel, when on this line of bearing, should be able to distinguish the red roof of a house, and a little further inland, rather obscured by trees, the dome of a church. 5

Rivière Antanambalana flows into the head of the bay on the northern side of Pointe Antsiraka (*Lat. 15° 28' S., Long. 49° 49' E.*); this sandy point is bordered by shoals extending about 1½ miles southward of it, with a depth of 25 feet (7<sup>m</sup>6) over their southern extremity; these shoals are reported to be extending westward. 10

Rivière Anjahanambo flows from westward along the head of the bay into the mouth of Rivière Antanambalana; between the Anjahanambo and the sea is a narrow sandy strip, with trees on it for nearly the whole of its length. Both rivers are accessible to boats. 15

The summit of Veringotra, about 3 miles west-south-westward of Pointe Antsiraka, is very conspicuous.

Nosy Marosy, 688 feet (209<sup>m</sup>7) high, the northern extremity of which is situated about 2 miles south-eastward of Pointe Antsiraka, is rocky and wooded; it was reported, in 1934, that less depths than those charted exist northward of this island. An above-water reef lies about 2 cables southward of the south-eastern extremity of the island. 20

Four rocky wooded islets, with lesser elevations than Nosy Marosy, lie within 4½ miles south-south-eastward of that island; Nosy Ravina is the northernmost, Nosy Haramy, the next, then an unnamed islet, and Nosy Milomboka, the southernmost. 25

None of these islands is inhabited.

A shoal, with a depth of 16 feet (4<sup>m</sup>9) over it, lies about 4½ miles west-south-westward of Pointe Antsiraka and three-quarters of a mile offshore. 30

The south-western extremity of Nosy Marosy in line with the north-eastern extremity of Nosy Haramy, bearing 150°, leads south-westward of the shoals bordering Pointe Antsiraka.

*Chart 758.*

The north-eastern cove of Baie d'Antongil has not been examined, nor the bight immediately southward on the shore of which is situated the village of Malailly. 35

**Directions.—Anchorages.** The islets at the head of the bay are conspicuous and, together with the conspicuous summit of Verengotra, enable a vessel to steer for Maroantsetra. 40

*Chart 679, plan of Approaches to Maroantsetra.*

There is anchorage off Maroantsetra, in depths of 6 fathoms (11<sup>m</sup>0), mud, with the beacons at the head of the bay in line, bearing 037°, and the south-western extremity of Nosy Marosy in line with the north-western extremity of Nosy Haramy, bearing about 155°; this anchorage affords no shelter from the south-east monsoon, when vessels should seek shelter at Port Memoria, on the western side of Nosy Marosy. 45

Vessels may anchor anywhere around Nosy Marosy (*Lat. 15° 30' S., Long. 49° 51' E.*), avoiding the reef above water previously mentioned, in depths of from 8 to 10 fathoms (14<sup>m</sup>6 to 18<sup>m</sup>3), about 2 or 3 cables offshore. Vessels are warned that shoaling is reported northward and north-westward of this island, see above. 50

*Charts 758, 2899, 597, 748a, 748b.*

*Chart 679, plan of Port Memoria.*

The best berth is in Port Memoria ; in 1932, the *Antarès* anchored here with a whitewashed rock on the eastern side of the bay in line with the whitewashed trunk of a large tree, bearing 078°, and the western fall of the land northward of the bay 355°, and found excellent shelter from southerly and easterly winds.

*Chart 679, plan of Approaches to Maroantsetra.*

**Port limits.**—The limits of the port of Maroantsetra are, approximately, lines drawn in an 000° direction to the high water line, and in an 090° direction to the foul ground southward of Pointe Antsiraka, from a position about 1½ miles south-westward of the light at Maroantsetra.

**Maroantsetra.**—The small town of Maroantsetra, surrounded by trees, is situated on the northern bank of Rivière Anjahanambo, close to its mouth ; a bridge spans this river.

Fowls, eggs, fruit, and rice are obtainable ; vegetables are scarce.

Tugs and lighters are available.

**Light.**—A light is exhibited at an elevation of 29 feet (8<sup>m</sup>8) from a white gallows surmounting a white hut, situated on the southern side of the sandy spit forming the southern bank of Rivière Anjahanambo.

**Signal station.—Storm signals.**—There is a signal station at Maroantsetra with which vessels can communicate by day.

Signals indicating the locality threatened by a cyclone, see page 27, are displayed.

**Communication.**—There is regular steamer communication with the other Madagascan ports. Maroantsetra (Lat. 15° 27' S., Long. 49° 49' E.) is connected with the general telegraph system.

*Charts 758, 2899, 597.*

## CHAPTER X

## EASTERN AND SOUTHERN COASTS OF MADAGASCAR

*Chart 597.*

**COAST.—General remarks.**—The eastern coast of Madagascar is, with good reason, noted for its inhospitable shore. During the south-east monsoon, viz. from April to October, it is subject to almost unceasing strong winds and a heavy swell breaking on the coast. 5 During the winter, rain squalls obscure the land, rendering it difficult to identify the landmarks; in addition, at this season, particularly between Cap Est (*Lat. 15° 14' S., Long. 50° 28' E.*) and Mananjary (Mananzhari), about 315 miles south-south-westward of Cap Bellone, or even as far northward as Baie de Diégo-Suarez, cyclones occur. 10

There is not a single good harbour to be found on this coast; Canal Sainte-Marie, between Ile Sainte-Marie and the coast, is the best harbour for large vessels, and Baie de Sainte-Luce, about 485 miles south-south-westward of Ile Sainte-Marie, for small vessels, but Tamatave, about 67 miles south-south-westward of Ile Sainte-Marie, is the 15 most important commercially.

**Local weather.**—See pages 48-51.

*Chart 759b.*

**Coast.—Dangers.**—From Cap Bellone the coast trends about 30 miles south-south-westward to Pointe Tintinia or Mahéla and is 20 high, cliffy, and wooded.

Nosy Atafa, a low islet lying about one mile offshore 6 miles southward of Cap Bellone, is surrounded by rocks; from a distance of over 2 or 3 miles it has the appearance of being two islets; the smaller and southern part is wedge-shaped. The darker vegetation of this islet 25 contrasts with the lighter vegetation of the coast.

Cap Lohatrozana, about 3 miles southward of Nosy Atafa, is fringed by a reef which extends as far as  $1\frac{1}{2}$  miles offshore; this cape should be given a wide berth.

*Chart 679, plan of Tintinga harbour.*

**Baie de Tintinga.—Islet and dangers.**—Baie de Tintinga is 30 entered between Pointe Tintinia (Tintinga) and the mouth of Rivière Fandrarazana, about  $2\frac{1}{4}$  miles south-south-westward; it affords sheltered anchorage, but is difficult of access. The north-eastern part of this bay, which is entered between Pointe Tintinia and the mouth 35 of Rivière Manompa, about three-quarters of a mile north-westward, is completely protected from all winds.

The coastal reef, which extends as far as 4 cables offshore off the mouth of Rivière Manompa, increases in width to about one mile

*Chart 679, plan of Tintinga harbour.*

near the entrance to Rivière Fandrarazana. The bay is encumbered with rocky shoals, with depths of only a few feet over them.

Nosy Vorona, or Ile des Sorciers, lies on the coastal reef, about 5 1½ miles westward of Pointe Tintinia (*see* views facing this page).

There are three channels into this bay, viz. Passe du Golo, Passe Royale (Royal pass), and Passe du Sud (South pass), but Passe du Golo, the northernmost of the three, is the only practicable one for vessels wishing to anchor in the north-eastern part of the bay; Passe 10 du Golo lies between the reef extending about one mile southward of Pointe Tintinia and some detached reefs about three-quarters of a cable farther southward, with depths of 6½ fathoms in it.

Access to this anchorage is at all times almost impossible without previously marking the channel, on account of the many alterations 15 of course which are necessary, and the frequent squalls which obscure the landmarks.

**Caution.**—Owing to the imperfect nature of the survey, the plan of Tintinga harbour should be used with great caution.

**Current.**—A current has been reported, usually setting east-south- 20 eastward, in the entrance channels to Baie de Tintinga (*Lat.* 16° 42' S., *Long.* 49° 44' E.), especially in Passe du Sud; it is probably caused by the rivers discharging into the bay.

**Pilots.**—A pilot must be employed and can be obtained at the Amboditavolo sawmills at the head of the north-eastern part of the 25 bay, near the mouth of Rivière Sahamantsy, which flows into the bay about 9 cables northward of Pointe Tintinia; the pilot will mark the dangers previous to entering the harbour.

**Directions.**—A vessel should approach steering 284° to a position one mile 165° from the western extremity of Pointe Tintinia; thence 30 she should steer into Passe du Golo with Nadaud house, with a zinc roof, situated close to the shore, open twice its own width northward of a sharp peak on the plain behind, bearing 277°. *See* view facing this page. Nadaud house in line with the peak, bearing 278°, is safe but leads only 50 feet (15<sup>m</sup>2) from the southern extremity of the reef 35 extending southward of Pointe Tintinia. The reef on the northern side of the pass is steep-to and easily seen at low water; that on the southern side is always covered, and does not show up.

As the services of a pilot are necessary no further directions are given.

40 **Anchorage.**—There is anchorage for vessels drawing 26 feet (7<sup>m</sup>9) between Pointe Tintinia and the mouth of Rivière Manompa.

Vessels drawing 19 feet (5<sup>m</sup>8) can anchor with Pointe Tintinia bearing 200°.

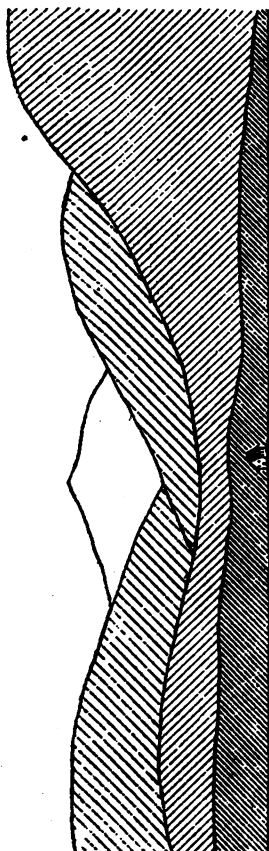
There is anchorage, in depths of 6 fathoms (11<sup>m</sup>0), mud, with Pointe 45 Tintinia bearing 195°, the saw mills chimney at Amboditavolo 025°, and the white patch on Nosy Vorona 252°. *See* view facing this page.

**Pier.**—A pier, alongside which vessels drawing 20 feet (6<sup>m</sup>1) can lie, is situated at Pointe Tintinia.

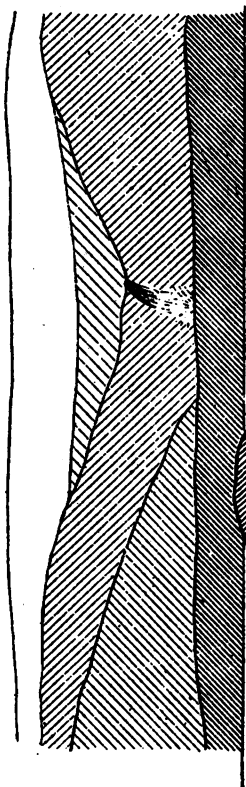
*Chart 683.*

50 **ILE SAINTE-MARIE.**—This island is slightly undulating, about 400 feet (121<sup>m</sup>9) high at its highest part, and is thickly wooded. At Port Sainte-Marie, about 20 miles south-south-westward of the northward extremity of the island, it is low, marshy, and about half a mile

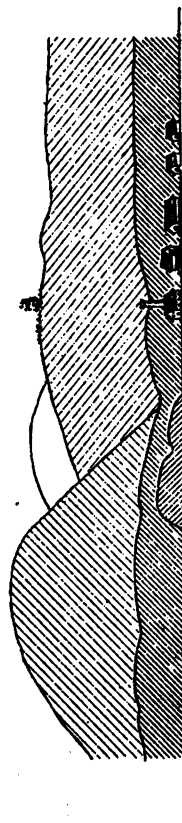
*Charts 683, 759b, 2899, 597.*



Sharp Nadoud  
Peak. House,  
bearing 277°.



Nosy Verona.  
Cascade,  
bearing 323°.



A  
Ambohitavolo  
sawmills,  
bearing 025°.

Three views of Baie de Tintinga.





*Chart 683.*

wide. Throughout the island the valleys are either beds of rivulets, or fresh-water or saltwater marshes, which latter cover at spring tides.

There is very little difference between the climate of Ile Sainte-Marie and that of the neighbouring coast of Madagascar where similar conditions of marshy land prevail, but the island is as unhealthy as the worst parts of the mainland. The sickly season is considered to be from January to the middle of May.

**Caution.**—This area has not been thoroughly examined, and the charts, being based on old surveys, should be used with caution. 10

**Western side.—Coast.—Dangers.**—Pointe Albrand (Point Halbrand), the northern extremity of Ile Sainte-Marie (*Lat.* 16° 41' S., *Long.* 50° 04' E.), is fringed by rocks, and may be identified by the forest within and the light-tower, about 2½ miles south-westward.

Between Pointe Albrand and Pointe des Cocotiers (Cocoanut point), 15 about 3½ miles south-westward, the coast forms a slight bight; Louaréa, a village, is situated on the shore of this bight, about one mile east-north-eastward of Pointe des Cocotiers.

Pointe des Cocotiers, a low projecting point, can be identified by its sandy beach; the northern part of this promontory is covered with 20 casuarina and coconut trees and the southern part by coconut trees only.

The village of Ambatouro (Ambatu-rao) is situated on the coast about one mile southward of Pointe des Cocotiers.

Pointe Ambalaombé, about 4½ miles south-westward of Ambatouro, 25 is fringed by rocks, above water and sunken.

A chain of rocks, above water, extends about one cable north-eastward of Pointe Tafondro, a promontory about 4 miles south-south-westward of Pointe Ambalaombé; this promontory should be given a prudent berth. 30

Anse de Lokintsy, on the eastern side of Pointe Tafondro, is open northward, and is encumbered with coral banks and reefs.

**Tidal streams.**—Off Pointe des Cocotiers the ebb stream sets southward and the flood stream northward, attaining a rate of about one knot. 35

**Light.**—A light is exhibited at an elevation of 255 feet (77<sup>m</sup>7) from an iron tower on a masonry base, 59 feet (18<sup>m</sup>0) in height, situated about 2½ miles south-westward of Pointe Albrand; this is a most conspicuous landmark.

**Anchorage.**—In 1932, the *Antarès* anchored off Louaréa, in depths 40 of 9 fathoms (16<sup>m</sup>5), sand, about 1½ miles 297° from Pointe Albrand light-tower; this anchorage, which is sheltered from easterly and southerly winds, is about 5 cables offshore, but the soundings taken by the *Antarès* show that there are no dangers between this position and the 5-fathom (9<sup>m</sup>1) line, about a cable offshore. A vessel approaching 45 this anchorage should steer for Pointe Albrand light-tower, bearing 117°, until within 2 miles of the coast.

There is anchorage in depths of 3½ fathoms (6<sup>m</sup>9), sand, about 4½ cables offshore, abreast the southern end of Ambatouro. This anchorage is open south-westward, but is sheltered from winds from 50 south, through east, to north-east.

Anchorage can be obtained off the entrance to Anse de Lokintsy in depths of 11 fathoms (20<sup>m</sup>1), with Pointe Tafondro, bearing 245°, distant 2½ cables. Landing is difficult on account of the coral reefs.

*Charts 759b, 2899, 597.*

*Chart 683, with plan of Port St. Mary.*

**Port Sainte-Marie.**—Port Sainte-Marie is entered between Pointe des Sorciers, about  $7\frac{1}{2}$  miles south-south-westward of Pointe Tafondro, and Rocher des Baleiniers, about  $1\frac{1}{2}$  miles south-westward of the former point; the shore of the port is marshy and bordered with mangrove trees.

Pointe des Sorciers (*Lat.  $16^{\circ} 59' S.$ , Long.  $49^{\circ} 54' E.$* ) consists of a hillock covered with vegetation; it is fringed by some black rocks.

Rocher des Baleiniers, lying close offshore on the coastal reef, is a high black rock, on the summit of which stands a conspicuous clump of shrubs.

Ilot Madame, about 7 cables south-south-westward of Pointe des Sorciers, has some fine vegetation, is the seat of government, and is connected with the main island by two foot-bridges; there is a small natural harbour close eastward of this islet, but it is reported to be shoaling and, in 1933, had not sufficient depth to allow a vessel of moderate size to proceed alongside the quay.

**Landmarks.**—The following landmarks are conspicuous:—The buildings on Ilot Madame; the powder magazine, situated on a hillock, about 130 feet ( $39^m6$ ) high, about a quarter of a mile eastward of Ilot Madame, and a white church, close south-westward of the powder magazine; this church stands out well when coming from northward, but only its steeple can be seen when eastward of Ilot Madame.

**Lights.**—A light is exhibited, at an elevation of 52 feet ( $15^m8$ ), from a tower, 16 feet ( $4^m9$ ) in height and painted in black and white horizontal bands, situated on a rock close off Pointe des Sorciers.

A light is exhibited, at an elevation of 33 feet ( $10^m1$ ), from a red iron hut, 20 feet ( $6^m1$ ) in height, situated on the northern extremity of Ilot Madame.

**Islets and dangers.**—**Buoyage.**—Shoals, with least depths of  $3\frac{1}{2}$  and  $4\frac{1}{2}$  fathoms ( $6^m4$  and  $8^m2$ ) over them, about  $3\frac{1}{2}$  and 5 cables, respectively, west-south-westward of Pointe des Sorciers light-tower, lie in the *white* sector of this light, between the bearings of  $050^{\circ}$  and  $230^{\circ}$ .

A shoal, with a depth of  $2\frac{3}{4}$  fathoms ( $5^m0$ ) over it, lies about 4 cables north-north-westward of Ilot Madame light-structure; a shoal, with a similar depth, about  $3\frac{1}{4}$  cables northward of the same light-structure, is marked on its western side by a light-buoy, painted black, and exhibiting a *white fixed* light; shoals, with depths of 5 and  $4\frac{1}{2}$  fathoms ( $9^m1$  and  $8^m7$ ), lie about half a cable north-eastward and half a cable southward, respectively, of the shoal marked by a light-buoy; a shoal, with a depth of  $3\frac{1}{2}$  fathoms ( $5^m9$ ), about 2 cables north-westward of Ilot Madame light-structure, is marked on its western side by a light-buoy, painted in black and red horizontal bands, and exhibiting a *red fixed* light. These shoals are covered by the *red* sector of Pointe des Sorciers light, between the bearings of  $340^{\circ}$  and  $050^{\circ}$ .

A shoal, with a depth of 2 fathoms ( $3^m7$ ) over it, marked on its eastern side by a red conical buoy, lies about one cable northward of Ilot Madame light-structure, at the northern edge of the coral reef extending northward of that islet; a reef fringes the north-western side of Ilot Madame, extending as far as one cable offshore.

The area south-eastward of Ilot Madame is encumbered with coral shoals, which are only just covered. Ilot aux Forbans, lying in this area, is covered with verdure.

*Charts 759h, 2899, 597.*

*Chart 683, with plan of Port St. Mary.*

**Directions.—Anchorages.—Beacon.—Lights.**—A vessel approaching Port Sainte-Marie (*Lat. 17° 00' S., Long. 49° 54' E.*), from northward or southward, should follow the coast of Ile Sainte-Marie, keeping about one mile offshore, until Ilot Madame light-structure is in line with the conspicuous white church mentioned on page 292, bearing 135°, which leads towards the outer anchorage. 5

At night, the light-buoy, exhibiting a *red fixed* light, in line with Ilot Madame light, bearing 138°, leads towards this anchorage.

Anchorage can be obtained on the leading line in depths of about 10 11 fathoms (20<sup>m</sup>1), muddy sand, with Pointe des Sorciers light-tower bearing 050°, the dividing line between the *white* and *green* sectors of that light.

There is also anchorage in depths of 6½ fathoms (11<sup>m</sup>9), with swinging room of about one cable, with the pyramidal beacon, painted in black and white horizontal bands, from which a light is occasionally exhibited, situated on the head of the jetty at Ambodifototra (Amboutifouth), about 2½ cables north-eastward of Ilot Madame light-structure, in line with the white band on the roof of the hangar nearest to the basin at Ambodifototra, bearing 095½°, and the light-structure on Ilot Madame bearing 171°; this anchorage is easy to take up at night, when a light, on each side of the entrance to the basin at Ambodifototra, is exhibited. 15 20

Vessels surprised in this roadstead by bad weather from southward or south-westward should take shelter under Pointe à Larrée, about 8½ miles north-north-westward of Pointe des Sorciers light-tower. 25

The jetty at Ambodifototra is for the use of lighters, which can enter the basin at high water.

The entrance to the small natural harbour is round the northern end of Ilot Madame; the quay on the eastern side of this harbour can only be used by small craft. This harbour is not considered safe during a cyclone. 30

**Port limits.**—The limits of the port are as follows:—

A line drawn from the high water line in a 315° direction through Pointe aux Sorciers light for a distance of about 19½ cables, thence in a 180° direction for 27 cables, thence in an 065° direction for 11½ cables to the southern extremity of Ilot Madame, and thence in an 087° direction about 2½ cables to the high water line. 35

**Communications.**—There is regular steamer communication with the other Madagascan ports. There is also occasional steamer communication with Marseilles. 40

The town is connected with the general telegraph system of Madagascar.

**Port facilities.**—A moderate supply of fresh provisions may usually be procured from the village near Pointe à Larrée on the mainland. 45

**Signal station.—Storm signals.**—There is a signal station on Ilot Madame.

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed.

*Chart 683.*

**Coast.**—From Rocher des Baleiniers (*Lat. 17° 00' S., Long. 49° 54' E.*) the coast trends about 7 miles south-south-westward to Pointe Blévec; the latter, usually considered the southern extremity of Ile Sainte-Marie, is actually the southern point of Ile des Nattes, which is 50

*Chart 683.*

low and is separated from the larger island by a narrow channel, which can be used by boats at all states of the tide.

- A reef extends about  $1\frac{1}{2}$  miles southward of Pointe Blévec; in 1945, a wreck, with a mast showing above water, was lying on this reef, about one mile southward of Pointe Blévec. There are depths of from 3 to 7 feet ( $0^m9$  to  $2^m1$ ) over the centre of the reef at high water; at half-tide boats can pass round the southern side of Ile des Nattes over the reef.

- 10 **Light.**—A light is exhibited at an elevation of 108 feet ( $32^m9$ ) from a stone tower, 16 feet ( $4^m9$ ) in height, situated on the summit of Ile des Nattes.

- Eastern side.**—The depths off the eastern side of Ile Sainte-Marie have been very imperfectly examined, but they appear to be much less than would be expected on the ocean side of an island bordered by coral reef. As far as is known the depths generally, from  $2\frac{1}{2}$  to 5 miles offshore, vary between 14 and 20 fathoms ( $25^m6$  and  $36^m6$ ); about 5 miles farther offshore depths of from 10 to 21 fathoms ( $18^m3$  to  $38^m4$ ) have been obtained. This coast is exposed to the south-east monsoon and a heavy swell sets on to it; it affords no shelter. The northern half appears to be free from dangers, but the southern part is fringed by a reef which extends as far as  $1\frac{1}{2}$  miles offshore; there are in addition several off-lying dangers.

- Off-lying dangers.**—Ank-horraka or La Baleine (Ankoraka) lies about 12 miles southward of Pointe Albrand light-tower and 2 miles offshore; the centre part of this reef shows above water as a sandy islet over which the sea almost always breaks.

A 10-fathom ( $18^m3$ ) patch, the position of which is approximate, lies about 6 miles south-eastward of Ank-horraka.

- 30 Banc Saphir, reported, in 1881, by the schooner of that name, lies about  $10\frac{1}{2}$  miles eastward of Pointe Blévec; it is formed of coral and sand, and has a least depth of 8 fathoms ( $14^m6$ ) near the centre.

- Anchorage.**—Anse de Koalabé (Ankolabe bay) is a cove situated about midway along the eastern side of Ile Sainte-Marie, and may provide a refuge for boats, but the passage has not been examined, and breakers have been seen there; it is entered through a narrow channel in a gap in the coastal reef. A white cliff at the head of this creek serves to identify the entrance.

- Southward of Anse de Koalabé there is no anchorage of any description, the breaks in the coastal reef only being available for canoes.

**Canal Sainte-Marie.**—**Western side.**—**Dangers.**—Canal Sainte-Marie (page 289) is only about 3 miles wide at its narrowest part south-eastward of Pointe à Larrée, which is situated about  $10\frac{1}{2}$  miles south-eastward of Pointe Tintinia.

- 45 Pointe à Larrée (*Lat.  $16^{\circ} 50' S.$ , Long.  $49^{\circ} 53' E.$* ) is a long, low, sandy projection, which is partly wooded, and is only visible from a distance of about 10 miles in clear weather; it is fringed by sandy shoals, extending to a distance of about half a mile offshore, the green colour of the water indicating their limit.

- 50 *Charts 683, 759b.*

The coast, from Pointe à Larrée to Fénériver, about 40 miles south-westward, was reported, in 1923, to be foul to a distance of about 5 miles offshore, and it was reported, in 1922, that shoal water existed nearly in mid-channel westward of Port Sainte-Marie.

*Charts 759b, 2899, 597, 748a.*

*Chart 683.*

Rivière Soamianina (Simiano) flows into the sea about 12½ miles westward of Pointe à Larrée ; on the north-eastern side of the entrance is the village of Andrangahazana.

From the mouth of Rivière Soamianina the coast trends about 5 4 miles south-westward, and consists of a sandy beach terminating in a black rocky hillock, 193 feet (58<sup>m</sup>8) high ; the village of Soanierana is situated on the southern side of the mouth of Rivière Marimbo, which flows into the sea on the northern side of this hillock.

A wharf, the position of which is doubtful, extends from the shore 10 about three-quarters of a mile south-south-eastward of the rocky hillock.

*Chart 759b.*

From the mouth of Rivière Marimbo the coast, which is low, trends about 19 miles south-south-westward to the entrance to Rivière 15 Maningory, and is fringed by reefs extending about 2 miles offshore ; the depths off this coast are moderately regular, and depths of 7 fathoms (12<sup>m</sup>8) are found about a mile offshore but, as already stated, foul ground was reported, in 1923, extending as much as 5 miles offshore.

Rivière Maningory is one of the largest and deepest rivers on the 20 eastern coast of Madagascar ; the village of the same name is situated at the mouth of this river, which is rendered impassable by a bar. The entrance to Rivière Maningory can be identified by a hilly point close northward, which contrasts with the low-lying coast trending south-south-westward. 25

**Currents.**—The currents generally are variable and of moderate strength, but are very strong off Pointe à Larrée ; as a rule they follow the direction of the wind, but the north-going set being the stronger, if the wind falls light during the south-east monsoon, the current becomes 30 reversed.

*Charts 683, 759b.*

**Anchorage.—Beacons.—Directions.**—Where the depths are suitable any part of Canal Sainte-Marie may be considered as a fairly secure roadstead ; anywhere northward of Pointe à Larrée (*Lat. 16° 50' S., Long. 49° 53' E.*) the holding ground is good, but southward of 35 that point the bottom is loose and sandy, and in this part the best anchorage is on the eastern side of the channel, where the reefs are steep-to and may be approached closely, whereas on the western side a heavy sea almost always tumbles home.

*Chart 683.*

Fandrarazana anchorage lies about 8½ miles north-westward of 40 Pointe à Larrée, and half a mile south-eastward of the reefs off the mouth of Rivière Fandrarazana. A sawmill and factory are conspicuous. Two white beacons in line, bearing 266°, lead to an anchorage in depths of 14 fathoms (25<sup>m</sup>6), good holding ground, about 4½ cables 45 offshore, sheltered from south-easterly winds, but not from the east-north-easterly swell.

Rivière Fandrarazana can only be entered by lighters.

A vessel approaching this anchorage from southward should keep about one mile offshore in depths of from 13 to 19 fathoms (23<sup>m</sup>8 to 50 34<sup>m</sup>7).

The constant swell from south-eastward setting into the bay south-westward of Pointe à Larrée renders landing anywhere on this coast very hazardous, even in the finest weather, in ships' boats, and, under

*Charts 759b, 2899, 597, 748a.*

*Chart 683.*

- ordinary circumstances, it should not be attempted. Anchorage can be taken up, in depths of about  $5\frac{1}{2}$  fathoms ( $10^m$ ), sand, off the village of Soanierana, with the wharf bearing  $270^\circ$ . A vessel approaching this anchorage should steer with the powder magazine at Port Sainte-Marie, astern, bearing  $110^\circ$ , and should not approach within  $1\frac{1}{2}$  miles of the coast until the wharf has been identified, because of an isolated rock, with a depth of 7 feet ( $2^m$ ) over it, situated about  $4\frac{1}{2}$  cables north-eastward of the black rocky hillock (page 295).
- 10 Soanierana is connected with the general telegraph system of Madagascar. There is a look-out station on the hillock near the village.

*Chart 759b.*

- COAST.**—From the mouth of Rivière Maningory the coast, which is low-lying and sparsely wooded, trends about 10 miles south-south-westward to Fénérive.

- Off-lying dangers.**—In 1871, breakers were seen from Fénérive, bearing about  $068^\circ$ , at an estimated distance of 8 miles; some 15 years later, during a calm and with a heavy swell, the *Romanche* saw breakers several times in the same direction and, in 1890, breakers were seen in the same place from the masthead of the cruiser *D'Estaing*, when about one mile distant. In 1884, the French ship of war *Boursaint* searched in vain for this shoal on the bearings given, and found depths of nothing less than 10 fathoms ( $18^m$ ). This supposed bank is marked as Fry shoal on the chart.

- 25 In October, 1884, the French gunboat *Capricorne* examined a bank which had been reported as a 26-foot ( $7^m$ ) shoal, lying about 11 miles east-south-eastward of Fénérive (*Lat.*  $17^\circ 22'$  S., *Long.*  $49^\circ 25'$  E.). Though numerous soundings were taken, and the water was very transparent for a depth of more than 11 fathoms ( $20^m$ ), depths of 30 nothing less than 11 fathoms ( $20^m$ ) was found. The bank was then described as not more than 6 or 7 cables long, in a north-easterly and south-westerly direction, and about half that width; it is now shown on the chart as being about 5 miles long in a northerly and southerly direction, with a depth of 39 feet ( $11^m$ ) at the southern end and of 35 22 feet ( $6^m$ ) at the northern end, and lying about 8 miles offshore.

In 1882, Captain Nourse passed over a bank near this position, finding depths of from 7 to 12 fathoms ( $12^m$  to  $21^m$ ), sand and rock.

- As regards these shoals, the *Hugon* passed up and down this coast several times, and although a good look-out was kept, no trace of either Fry shoal or Banc du Capricorne was seen. Nevertheless, from the repeated reports, it can hardly be doubted that foul ground exists in these localities, and the difficulty of finding coral rocks of small extent is well known; therefore, when navigating in these parts, the utmost caution should be observed.

45 *Charts 680, plan of Fénérive; 759b.***FÉNÉRIVE AND APPROACHES.—Landmarks.—Beacons.—**

- The position of the town of Fénérive, standing westward of Pointe de la Douane (du Nouvel Hôpital), about 10 miles south-south-westward of the mouth of Rivière Maningory, may be identified by the elbow 50 formed by the coast at Pointe Sud-Est,  $2\frac{1}{2}$  miles south-eastward of Pointe de la Douane, also by a group of three detached hills, near the coast, about  $1\frac{1}{2}$  miles south-eastward of the town; Lakaria, the south-

*Charts 759b, 2899, 597, 748a.*

*Charts 680, plan of Fénérive; 759b.*

easternmost of these hills, 162 feet (49<sup>m</sup>9) high, has on it a pyramidal masonry beacon, painted in black and white horizontal bands; the Residency, a white house standing on the north-westernmost of the three detached hills, with a flagstaff close by, is visible for some distance. 5

*Chart 680, plan of Fénérive.*

Nosy Ilainsambo (Ilansambo), lying about 6½ cables east-south-eastward of Pointe de la Douane and 2 cables offshore, with no passage between it and the coast, is low, covered with trees, and fringed by a sandy beach above a continuous reef, over which the sea breaks heavily, 10 extending about 2 cables north-eastward of the islet; the reefs cause the islet to stand out well when approaching from south-eastward, but from north-eastward it is not distinguishable from the coast behind it until within 3 or 4 miles.

The old fort of Vohemaso (Vohimassoa), standing on a barren flat-topped hill, about 1½ miles south-westward of Pointe de la Douane, with a marsh and a watercourse between it and the coast, is conspicuous; a framework beacon, painted in red and white horizontal bands, is situated at the old fort.

Pointe Sud-Est (Lat. 17° 24' S., Long. 49° 26' E.) is moderately high 20 and covered with trees.

**Lights.—Beacons.**—A light is occasionally exhibited from a framework beacon, painted in white and red horizontal bands, situated on Pointe de la Douane, and a light is also occasionally exhibited at an elevation of 115 feet (35<sup>m</sup>0) from the beacon on the old fort at Vohe- 25 maso; these lights are in line bearing 229°.

A light is occasionally exhibited from a triangular beacon, painted in white and red horizontal bands, situated at the Custom house, about 6 cables south-south-eastward of Pointe de la Douane light, and another light is also occasionally exhibited at an elevation of 118 feet (36<sup>m</sup>0) 30 from the Residency flagstaff; these lights are in line bearing 189°.

A triangular beacon, painted in black and white horizontal bands, stands on Pointe Sud-Est.

**Dangers.**—Several detached shoals, the positions of which can best be seen on the chart, having a least depth of 11 feet (3<sup>m</sup>4) over them, 35 lie within 2½ miles north-eastward and 1½ miles eastward of Pointe de la Douane; the position of the north-easternmost of these shoals, with a depth of 27 feet (8<sup>m</sup>2), on which s.s. *Imerina* struck, in 1930, is doubtful; the easternmost of these shoals, with a depth of 22 feet (6<sup>m</sup>7), the position of which is approximate, lies about 1½ miles east-north- 40 eastward of Nosy Ilainsambo.

Vessels should never attempt to pass between these detached shoals and the reef extending north-eastward of Nosy Ilainsambo.

The coast, from between a point about 2½ cables southward of Nosy Ilainsambo and Pointe Sud-Est, is fringed by a reef over which the sea 45 breaks and which extends as far as 4 cables offshore.

*Charts 680, plan of Fénérive; 759b.*

**Directions.**—A vessel approaching from northward should keep about 5 miles offshore until the beacon on Pointe de la Douane is in line with the beacon on the fort at Vohemaso, bearing 229°, which 50 leads to the anchorage. Care must be taken not to get south-eastward of the leading line on account of the shoals in its vicinity.

A vessel approaching from south-eastward should pass about a mile off Pointe Sud-Est and thence steer 340° for about 4 miles, until the

*Charts 759b, 2899, 597, 748a.*

L\*



*Charts 680, plan of Fénérive; 759b.*

leading line for the anchorage, mentioned above, is reached, whence proceed as previously directed.

*Chart 680, plan of Fénérive.*

- 5 **Anchorage.**—The anchorage off Fénérive is dangerous during the winter, and very bad at all times. There is a berth for small vessels in depths of 26 feet (7<sup>m</sup>9), sand, with Pointe de la Douane and Vohemaso beacons in line, bearing 229°, and the Custom house beacon in line with the Residency flagstaff, bearing 189°. Care must be taken when  
10 anchoring to avoid the 19-foot (5<sup>m</sup>8) coral patch close north-westward of this position, and vessels are advised to anchor about one cable south-south-westward of the berth described above in depths of 26 feet (7<sup>m</sup>9).

- Moderate sized vessels can obtain anchorage in depths of about 5 fathoms (9<sup>m</sup>1) with Pointe de la Douane and Vohemaso beacons in  
15 line, bearing 229°, and the beacon on Lakaria bearing 177°.

Large vessels can obtain anchorage in depths of 6½ fathoms (11<sup>m</sup>9) with Pointe de la Douane beacon (*Lat. 17° 22' S., Long. 49° 24' E.*) in line with the beacon on the fort at Vohemaso, bearing 229°, and the beacon on Lakaria bearing 192°.

- 20 Landing can be effected at a pier fronting the Custom house; it is sheltered by Nosy Ilainsambo and the reef southward of it.

**Port limits.**—The limits of the commercial port are as follows:—

- From a position on the high water line 000°, about 2½ cables from the beacon on Lakaria hill, a line drawn in an 090° direction for a distance  
25 of 14 cables, thence in an 000° direction for 25½ cables, thence in a 270° direction for 25½ cables, and thence in a 180° direction for about 14½ cables to a position on the high water line where the conspicuous grey house, situated about 7½ cables west-north-westward of Pointe de la Douane, bears 231°.
- 30 Vessels are only permitted to embark or disembark anything within these limits of the commercial port.

**Port facilities.**—Fresh meat, poultry, and fish may be procured. The surrounding country produces rice and coconuts.

Lighters are available.

### 35 *Chart 759b.*

- COAST.**—**Dangers.**—Between Pointe Sud-Est and Foulpointe, about 15 miles south-south-eastward, the coast is irregular, consisting of a series of beaches and rocky points, fringed by rocks, especially off the points, from which reefs extend as much as 5 or 6 cables offshore,  
40 as is shown by the breakers. The land within the coast is a succession of hillocks covered with trees, having no distinguishing features except the reddish colour of the ground about Mahambo, 5 miles southward of Pointe Sud-Est. In the background are high wooded mountains receding south-westward from the coast.

- 45 Between the wooded point eastward of the village of Mahambo, and the mouth of Rivière Isiritra, about 1½ miles north-westward, lie two other points bordered by rocks. On the reef extending from the middle point of the three is a remarkable rock resembling a ship's bitt, and called La Bitte. Penelope's pie is a rocky patch connected with  
50 the reef extending from the north-western point; it is the outer danger in this part of the bay, extends some distance under water, and is very dangerous. The reef extending from the north-western point is very irregular, and throws out spurs; while that extending from the middle

*Charts 759b, 2899, 597, 748a.*

*Chart 759b.*

point, on which lies La Bitte, is steep-to, the sea only breaking near the point.

Banc du Capricorne, lying about 8 miles eastward of Mahambo, is described on page 296.

5

**Anchorage.**—The best anchorage, but only practicable for small vessels with local knowledge, is, in depths of about 5 fathoms (9<sup>m</sup>1), northward of Mahambo (*Lat.* 17° 30' S., *Long.* 49° 28' E.) and north-westward of the middle point; La Bitte being a sufficient guide to it. The middle point being well marked by breakers should be rounded 10 closely, whilst Penelope's pie must be carefully avoided.

Large vessels must anchor outside the reefs where they are exposed to the swell.

*Charts 680, plan of Foulpointe; 759b.*

**Foulpointe.**—**Aspect.**—**Current.**—The coast in the vicinity of 15 Foulpointe may be identified by some high white sandhills, with trees on their summits.

The current nearly always sets northward.

Foulpointe is a large village standing on low ground, and is nearly surrounded by lakes, which swarm with crocodiles. Two houses, with 20 red roofs, are conspicuous from the offing, the northern of which is the Residency; a conspicuous clump of coconut trees is situated close to the Residency.

Some fresh provisions can be obtained here.

**Dangers.**—About 4 miles northward of Foulpointe and 3 miles 25 offshore lies a coral bank, with depths of 6½ fathoms (11<sup>m</sup>9) over it, of 10 fathoms (18<sup>m</sup>3) inside it, and of 16 or 17 fathoms (29<sup>m</sup>3 or 31<sup>m</sup>1) outside it; this is believed to be the only outlying bank in the immediate vicinity. See also page 296.

There are several other detached reefs and shoals in the bay, situated 30 within the 3-fathom (5<sup>m</sup>5) line.

The anchorage is sheltered by a projection of the coastal reef which fringes the coast southward of Foulpointe, and extends about a mile north-north-eastward of the village; its edges are not steep-to. Between this reef and the coast is a narrow channel. 35

**Directions.**—The reef which shelters the roadstead should not be approached; in the afternoon when it is seen in the sun it is impossible to make out its limit, but a little northward, in the background, is a very remarkable pointed summit, which steered for, bearing about 270°, leads 1½ miles northward of the reef. When the Residency 40 bears 210° the reef has been cleared and course may be altered gradually southward towards the anchorage.

*Chart 680, plan of Foulpointe.*

**Anchorage.**—There is safe anchorage during the fine season, from April to October, when the prevailing winds are from between south 45 and south-east. It is open to northerly and north-easterly winds, but these seldom last long, and do not raise a high sea.

Anchorage can be obtained in depths of 7 fathoms (12<sup>m</sup>8), speckled sand, good holding ground, with the coconut trees close to the Residency bearing 190° and the northern extremity of the coastal reef 50 extending north-north-eastward of the village bearing 090°; this anchorage, which affords reasonable shelter from northerly winds, is only about one cable from the 5-fathom (9<sup>m</sup>1) line.

There is anchorage in depths of from 4½ to 5½ fathoms (8<sup>m</sup>7 to 10<sup>m</sup>1),

*Charts 759b, 2899, 597, 748a.*

*Chart 680, plan of Foulpointe.*

sand, with the eastern extremity of the village (*Lat. 17° 40' S., Long. 49° 32' E.*) bearing 202° and the flagstaff on the fort 231°; the anchorage is only about half a cable from the 3-fathom (5<sup>m</sup>5) line and one cable from the coastal reef extending north-north-eastward of the village. Vessels should moor, open hawse south-south-eastward. This anchorage is convenient for small vessels during southerly winds but, if blowing strongly from this direction, a slight easterly swell is felt in the roadstead, causing vessels to roll.

- 10 The creek between Foulpointe and the coastal reef eastward is only available for small craft with local knowledge. The landing place is on the coast here.

*Chart 759b.*

- Coast.—Aspect.—Dangers.**—From Foulpointe the coast trends about 30 miles southward to Tamatave; it is fringed for about the first 8 miles by a reef, the edge of which is not well defined, and should not be closed within a distance of half a mile.

- Mamelles de Natte (Nate paps), about 11 miles south-south-westward of Foulpointe and 2 miles inland, are two conspicuous hills, 572 and 533 feet (174<sup>m</sup>4 and 162<sup>m</sup>5) high, respectively; about 1½ miles eastward of them are two somewhat similar hills, Fausses Mamelles, 379 and 395 feet (115<sup>m</sup>5 and 120<sup>m</sup>4) high, respectively, which might be mistaken for Mamelles de Natte in hazy weather. Southward of these hills the coast is thickly wooded and decreases in elevation towards Tamatave.

- As the white sandy coast southward of Mamelles de Natte is free from dangers outside a distance of 2 or 3 cables, vessels proceeding along the coast should keep about a mile offshore, and thus pass within all the outlying dangers reported off this part of the coast. This practice is particularly recommended by day, and also, for those with local knowledge, on a clear night, for the land is easily followed by the white line of breakers, as well as by some conspicuous objects easily identified.

- Rivière Ifontsy flows into the sea about 3 miles southward of Fausses Mamelles; the village of Ifontsy is situated on the western side of this river, just within its entrance.

*Charts 688, 759b.*

- Rivière Ivoloina (Ivolina) flows into the sea about 10 miles south-south-westward of the mouth of Rivière Ifontsy; the village of Vohidrotra stands on the northern side of the mouth of the river.

- TAMATAVE AND APPROACHES.**—Tamatave is the most important place on the eastern coast of Madagascar; its connection by rail with Tananarive (Antananarivo), about 115 miles west-south-westward, and its quays, make it the principal port of Madagascar. The harbour lies between Pointe Tanio, about 4½ miles southward of the mouth of Rivière Ivoloina, and Pointe Hastie, 1½ miles south-south-eastward of Pointe Tanio.

- A breakwater extends north-north-eastward from the northern extremity of Pointe Hastie (*Lat. 18° 09' S., Long. 49° 26' E.*), and south-westward of this breakwater are Mole A and Mole B, the western and eastern wharves, respectively; in 1943, the outer 250 feet (76<sup>m</sup>2) of the breakwater and the inner ends of the two wharves were damaged by a cyclone; the outer edge of the breakwater was, in 1945, marked by a beacon.

*Charts 759b, 2899, 597, 748a.*

*Charts 688, 759b.*

**Aspect.—Landmarks.**—The land about Tamatave, though not flat, is low, consisting of small hillocks, and is difficult to identify from seaward, but the high land behind may be seen in clear weather from a distance of 35 miles. 5

The approach, however, presents no difficulty in clear weather, as there are several landmarks, but in bad weather it is more difficult on account of the outlying dangers.

Approaching from north-eastward, Mamelles de Natte and Fausses Mamelles (page 300) will be seen, also Vohitravoha, an isolated barren cone-shaped hill, 776 feet (236<sup>m</sup>5) high, about 10 miles south-south-westward of Mamelles de Natte; Ile aux Prunes, or Nosy Alanana, lying 5½ miles north-north-eastward of Pointe Tanio, is conspicuous on account of its tall trees and its light-tower. 10

The town can be identified from the offing by some large electric cranes on the moles. 15

Other conspicuous marks are the radio masts, about three-quarters of a mile west-north-westward of Pointe Tanio; the hospital, consisting of some large buildings, with red roofs, standing on Pointe Tanio; the Governor-General's residence, a white building with colonnades, about half a mile south-south-westward of Pointe Tanio; a white church, with two square towers, about three-quarters of a mile south-south-eastward of the Governor-General's residence; and some hangars, with concrete roofs, at the foot of the electric cranes mentioned above. 20

The sandy beach southward is also conspicuous, and the breakers on the outer reefs may be seen from a distance of 4 or 5 miles. 25

**Currents.**—Caution is necessary on account of the uncertainty of the current, for at the same season, and apparently under similar conditions a vessel may be set 10 or 12 miles either northward or southward. With south-easterly winds, no reliance can be placed on experiencing a north-going current, but with winds from between north and north-east, which are comparatively rare, a fairly strong south-going current will generally be found; on the whole it is best to be prepared for the latter and, if approaching from eastward, to make the land between Mamelles de Natte and Ile aux Prunes. 30

The currents near the coast and in the channels leading to Tamatave (*Lat.* 18° 09' S., *Long.* 49° 26' E.) are much affected by the wind and, usually, set in the same direction as the wind. 35

During the north-east monsoon, viz., from October to December, it often happens that the current continues to set southward, even when a southerly wind has been blowing for some time; again, during the dry season, the current, sometimes, sets strongly northward, even when the southerly winds, which predominate during this season, are not blowing, but it is also possible to experience a southerly set when a southerly wind is blowing. 40

The maximum rate of the southerly current, from observations made during 1931 to 1933, is about 1½ knots; the north-going current attained a slightly lesser rate. It is probable that these rates are exceeded with strong winds. 45

The currents appear to be stronger southward than northward of Tamatave. 50

*Chart 688.*

**Pilots.**—Pilotage is not compulsory.

During the day, a small boat, displaying the pilot flag, indicates the

*Charts 759b, 2899, 597, 748a.*

*Chart 688.*

anchorage; vessels entering the harbour by night must be ready to shift berth, at daylight, if required by the port authorities.

Vessels requiring a pilot should report the time of arrival to the Port office by radio.

*Chart 759b.*

**Off-lying island and dangers.—Light.**—A bank, with a depth of 13 fathoms (23<sup>m</sup>8), sand and rock, lies about 21 miles north-eastward of Tamatave and 12 miles offshore; a bank, with a depth of 46 feet (14<sup>m</sup>0) over it, lies about 1½ miles southward of the 13-fathom (23<sup>m</sup>8) bank. These outer banks have not been closely examined, and less depths may be found than are shown on the chart.

Banc d'Ifontsy, with a least depth of 25 feet (7<sup>m</sup>6) over it, lies about 17 miles north-north-eastward of Tamatave and 4 miles offshore; it appears to be the northernmost of a chain of reefs extending southward towards Tamatave.

Banc Marie Eugénie, with a least depth of 21 feet (6<sup>m</sup>4) over it, lies about 2½ miles southward of Banc d'Ifontsy; a shoal, with a depth of 6 feet (1<sup>m</sup>8), lies about 2 miles southward of Banc Marie Eugénie.

Récif du Nord (North reef), over which the sea breaks heavily in bad weather, and the northern extremity of which is situated about 6 miles south-south-westward of Banc Marie Eugénie, extends 1½ miles south-south-westward to within about 6 cables north-eastward of Ile aux Prunes; there is a least depth of 13 feet (4<sup>m</sup>0) over this reef.

Vessels are warned not to attempt to pass between Banc Marie Eugénie and Récif du Nord.

*Chart 759b.*

Westward of an imaginary line joining Banc d'Ifontsy and Récif du Nord are some detached banks, the shallowest of which, Banc Rangazava, with a least depth of 32 feet (9<sup>m</sup>8) over it, lies about 3½ miles northward of Ile aux Prunes and 2 miles offshore; this shoal lies in a white sector of Pointe Tanio light (*Lat.* 18° 08' S., *Long.* 49° 26' E.), between the bearings of 192° and 201°.

*Chart 688.*

Ile aux Prunes is low, level, and of coral formation, with abrupt perpendicular coasts. The regular dark green foliage of the trees, with which it is covered, renders it conspicuous, causing it to stand out in strong relief against the mainland; it can be distinguished from a distance of 15 miles. It is fringed by a reef. Landing may be effected in fine weather through a small passage formed by a break in the reef on the north-western side. There is a quarantine establishment on the island.

A light is exhibited, at an elevation of 196 feet (59<sup>m</sup>7), from a tower, 183 feet (55<sup>m</sup>8) in height, situated near the centre of Ile aux Prunes.

Banc des Six Mètres (Three Fathom bank), over which the sea frequently breaks, has a least depth of 2½ fathoms (5<sup>m</sup>0), coral, and lies about 1½ miles south-south-westward of Ile aux Prunes; the eastern part of this reef is covered by a green sector of Pointe Tanio light, between the bearings of 207° and 211°, and the western part of the reef by a red sector of the same light, between the bearings of 201° and 207°. Vessels should not pass between this reef and Ile aux Prunes.

Le Petit récif (Little reef), lying about 1½ miles southward of Banc des Six Mètres, does not uncover, but the sea breaks heavily over it.

*Charts 759b, 2899, 597, 748a.*

*Chart 688.*

Le Grand récif (Great reef), the northern end of which is situated about 7 cables south-westward of Le Petit récif, extends about  $1\frac{1}{4}$  miles south-south-westward, and dries; its western edge is always visible, and can be safely approached within a distance of one cable. These reefs are covered by the *green* sector of Pointe Hastie light, between the bearings of  $189^\circ$  and  $216^\circ$ , and Le Petit récif is also covered by a *red* sector of Pointe Tanio light, between the bearings of  $218^\circ$  and  $245^\circ$ .

The passage between Le Grand récif and Le Petit récif should be avoided on account of the absence of leading marks and the uncertainty of the currents.

**Lights.**—A light is exhibited, at an elevation of 65 feet ( $19^m8$ ), from a white iron tower, 43 feet ( $13^m1$ ) in height, situated on Pointe Tanio.

A light is exhibited, at an elevation of 85 feet ( $25^m9$ ), from a grey and white pylon, surmounted by a lozenge-shaped daymark, painted black and white, 72 feet ( $21^m9$ ) in height, situated about half a cable north-westward of the first mentioned light.

A light is exhibited from each corner of Mole A, about one mile south-south-eastward of Pointe Tanio front leading light, and another from the south-western angle of this mole.

Two lights are exhibited from the landing place on the south-western side of the entrance to the boat harbour, about one cable south-south-eastward of the light on the south-western angle of Mole A.

A light is exhibited, at an elevation of 33 feet ( $10^m1$ ) from a white metal tower with a black horizontal band, 30 feet ( $9^m1$ ) in height, situated on Pointe Hastie (*Lat.  $18^\circ 10' S.$ , Long.  $49^\circ 26' E.$* ).

**Dangers.**—**Buoys.**—A bank, with a least depth of  $1\frac{1}{2}$  fathoms ( $2^m7$ ), over which the sea does not always break, extends about  $3\frac{1}{4}$  cables east-north-eastward of Pointe Tanio, and is marked at its north-eastern extremity by a red spar buoy, surmounted by a cone; being mainly composed of sand, both form and position are liable to change when rollers set in, as they frequently do during the hot season. This shoal is covered by the *red* sector of Pointe Hastie light, bearing less than  $182^\circ$ .

A red conical buoy, surmounted by a cone, is moored on the western side of the roadstead, about 4 cables north-north-westward of the light at the north-western corner of Mole A.

Pointe Hastie is fringed by a reef which dries and which extends as much as  $2\frac{1}{4}$  cables offshore; a bank, with depths of less than 3 fathoms ( $5^m5$ ), coral and sand, extends about one cable northward of the northern extremity of this reef, and is marked on its north-western side by a black spherical buoy, surmounted by a ball; detached shoals, with least depths of  $4\frac{1}{4}$  fathoms ( $7^m8$ ) over them, lie within  $2\frac{1}{4}$  cables of the eastern edge of this reef.

An 8-foot ( $2^m4$ ) coral patch about one cable westward of Mole A is marked by a red conical buoy.

*Charts 688, 759b.*

**Channels.**—**Directions.**—**Beacons.**—The best time for making the land is between 0700 and 1000.

*Passe du Nord-Est.*—*Passe du Nord-Est*, between Banc d'Ifontsy and Banc Marie Eugénie, can only be used in the daytime; it has a least depth of 6 fathoms ( $11^m0$ ) in the fairway.

Manguier boule, a 293-foot ( $89^m6$ ) hill,  $7\frac{1}{4}$  miles southward of Mamelles de Natte and  $1\frac{1}{2}$  miles inland, in line with the conical summit of

*Charts 759b, 2899, 597, 748a.*

*Charts 688, 759b.*

Vohitravoha, bearing 253°, leads through the fairway of Passe du Nord-Est into Passe du Nord (North pass).

*Passe du Nord.*—Passe du Nord, between Ile aux Prunes and the dangers north-north-eastward and south-south-westward of it, on its eastern side, and the coast, on its western side, has a least depth of 11 fathoms (20<sup>m</sup>1) in the fairway; care must be taken by deep draught vessels to avoid Banc Rangazava, with a depth of 32 feet (9<sup>m</sup>8) over it.

To enter the roadstead a vessel must keep eastward of the buoy marking the bank extending east-north-eastward of Pointe Tanio and keep close to Le Grand récif, the western edge of which, as already stated, is always visible.

At night a vessel should keep in the *white* sector of Tanio point light, between the bearings of 192° and 201° until the *white* sector of Hastie point light, between the bearings of 182° and 189° has been identified, which leads to the anchorage.

*Chart 688.*

*Grande Passe de l'Est.*—Grande Passe de l'Est (Great East pass), between Banc des Six Mètres and Le Petit récif (*Lat.* 18° 06' S., *Long.* 49° 27' E.), has a least depth of 8 fathoms (14<sup>m</sup>6) in the fairway; it is easy to navigate during daylight, especially in the morning, the light then being favourable.

Banc des Six Mètres is marked by a moderate swell over it, but Le Petit récif, which has only a very slight swell over it, is, as already stated, marked by breakers.

Two triangular pyramidal masonry beacons, 41 feet (12<sup>m</sup>5) in height, stand close to Salazamay village about 2 miles south-south-westward of Vohidrotra. The front beacon, which is white, but from a distance appears to be painted in black and white horizontal bands, stands on the coast, and the rear beacon, which is painted in black and white horizontal bands, is situated about 5½ cables westward of the front beacon; these beacons, when in line, bear 269°, and, in 1941, were reported to show up badly on account of the dense foliage.

A vessel using this pass should steer through it with Salazamay beacons in line, bearing 269°, and, when through it, alter course southward, steering through Passe du Nord as described previously; Salazamay beacons are difficult to see when the sun is in the west.

At night, a vessel can steer in from north-eastward, keeping in a *white* sector of Pointe Tanio light, between the bearings of 211° and 218°, but, owing to the dangers on either hand of this sector and especially on account of the currents setting across it, care must be taken not to get outside the sector; this course should be held until in the *white* sector of Pointe Hastie light, between the bearings of 182° and 189°, which leads southward to the anchorage.

In clear weather, at night, the width of Grande Passe de l'Est permits of a vessel proceeding through it by bearings of the lights on Ile aux Prunes and Pointe Tanio, until in the *white* sector of Pointe Hastie light, between the bearings of 182° and 189°.

*Passe du Sud.*—Passe du Sud (South pass), between Le Grand récif and the breakwater extending north-north-eastward from the northern extremity of Pointe Hastie, is about 1½ cables wide, with depths of more than 5½ fathoms (10<sup>m</sup>1); this entrance channel is the one most frequently used, but large vessels may find it inconvenient as there is little room for manœuvring if proceeding to the northern anchorage.

*Charts 759b, 2899, 597, 748a.*

*Chart 688.*

The light-structures on Pointe Tanio, in line, bearing about  $313^\circ$ , and at night, the *white* sector of Pointe Tanio leading light, between the bearings of  $309^\circ$  and  $317^\circ$ , leads through the fairway of Passe du Sud.

A vessel using this channel must not get north-eastward of the leading line on account of the shoal water extending south-south-westward of Le Grand récif, and care must also be taken on account of the currents which, at certain periods of the year, set on to this reef; it is advisable for a vessel to have sufficient speed to enable her to manœuvre quickly.

The *white* sector of Pointe Hastie light (*Lat.*  $18^\circ 10' S.$ , *Long.*  $49^\circ 26' E.$ ), between the bearings of  $182^\circ$  and  $189^\circ$ , leads, from within the channel, to the anchorage.

**Anchorage.—Beacon.**—The best anchorage is in depths of from 11 to 12 fathoms ( $20^m$ 1 to  $21^m$ 9), mud, good holding ground, with Pointe Tanio light-structure bearing  $252^\circ$  and Pointe Hastie light-tower  $185^\circ$ ; this anchorage is well sheltered.

Northward of Pointe Tanio a vessel will be exposed to north-easterly winds, but southward of this point there is restricted swinging-room for large vessels.

There is anchorage farther southward in depths of 11 fathoms ( $20^m$ 1), mud, about three-quarters of a mile south-eastward of Pointe Tanio from leading light-structure.

A white masonry beacon, 13 feet ( $4^m$ 0) in height, stands close to the coast, about three-quarters of a mile southward of Pointe Tanio light-structure; this beacon, bearing  $260^\circ$ , indicates the anchorage northward of the town.

Small vessels with local knowledge can anchor off the town in depths of from  $3\frac{1}{2}$  to  $3\frac{3}{4}$  fathoms ( $5^m$ 9 to  $6^m$ 9).

**Boat harbours.**—At the head of the harbour are two boat harbours separated from each other by a mole, known as Môle Hastie; the western one was dredged, in 1943, to a depth of 6 feet ( $1^m$ 8), and the eastern to a depth of 11 feet ( $3^m$ 4). A channel, dredged to a depth of 13 feet ( $4^m$ 0), leads to these boat harbours.

**Port limits.**—From the breakwater head, a line drawn in an  $090^\circ$  direction for a distance of  $1\frac{1}{2}$  cables, thence in an  $000^\circ$  direction for  $15\frac{1}{2}$  cables, thence in a  $270^\circ$  direction for  $4\frac{1}{2}$  cables, and thence in a  $196^\circ$  direction for about  $16\frac{1}{2}$  cables to the beacon situated about 8 cables westward of the head of the breakwater. In addition, an area, about three-quarters of a cable in width on each side of the leading line through Passe du Sud and extending about  $16\frac{1}{2}$  cables south-eastward from the south-eastern corner of the limits described above, is included in the port limits.

**Quays.**—A quay, 520 feet ( $158^m$ 5) long, with a least depth of 24 feet ( $7^m$ 3) alongside, is situated on the western side of Mole B, and on the eastern, western, and northern sides of Mole A, are quays 330 feet ( $100^m$ 6), 450 feet ( $137^m$ 2), and 196 feet ( $59^m$ 7) in length, respectively, with least depths of 24, 19, and 24 feet ( $7^m$ 3,  $5^m$ 8, and  $7^m$ 3) alongside.

The quays are furnished with bollards.

A vessel can proceed alongside the quays at all states of the tide, with her head in either a northerly or southerly direction.

Mole A is rarely used, as Mole B possesses better mooring facilities.

There are at times heavy surges alongside the moles; these surges occur suddenly and have no reference to the state of the sea outside the harbour. No mooring is absolutely secure at such times.



*Chart 688.*

From November to February heavy storms are experienced which affect berthing at the quays owing to the swell, and may necessitate vessels putting to sea or anchoring in another harbour.

- 5 **Town.**—The town of Tamatave is situated on the coast stretching from Pointe Tanio to Pointe Hastie (*Lat.* 18° 10' S., *Long.* 49° 26' E.), the European town occupying the northern part of the peninsula; the native village, westward of the European town, is called Tanambo.

Tamatave is the capital of the province of that name, and is the  
10 commercial centre and principal trading port of the island. The population, in 1943, was 24,594.

A British Consular officer resides here.

- Communication.**—Tamatave has regular steamer communication with Europe and the Union of South Africa, as well as with other ports  
15 in Madagascar.

It is connected with the general telegraph and telephone system.

Tamatave is connected with the general railway system of Madagascar.

There is a radio station here; *see* page 26.

- 20 **Port facilities.**—Fresh provisions are plentiful. Water is laid on to the quays, and there are two water-boats.

No coal is stocked, but in an emergency from 100 to 200 tons might be procured.

Tugs and lighters are available.

- 25 There are several cranes, from 2 to 10 tons capacity, a floating crane capable of lifting 105 tons, also a one-ton travelling electric crane. Small repairs can be executed.

There is a hospital at Pointe Tanio, to which sailors are admitted. There is also a native hospital.

- 30 At the Public works department mariners can obtain information with regard to the navigation of the coasts and ports of Madagascar, also information with regard to weather conditions in Madagascar and its dependencies.

**Shipping.—Trade.**—In 1938, 7,364 vessels of 4,306,309 tons, of  
35 which 6,154 were French and 837 British, entered this port.

The principal exports are coffee, tapioca, rice, graphite, hides, manioc roots, maize, and chilled meat.

**Signal station.—Storm signals.**—There is a signal station at the Port office, with which vessels can communicate by day.

- 40 Signals indicating the locality threatened by a cyclone, *see* page 27, are shown at Tamatave.

**Deratisation.**—*See* page 21.

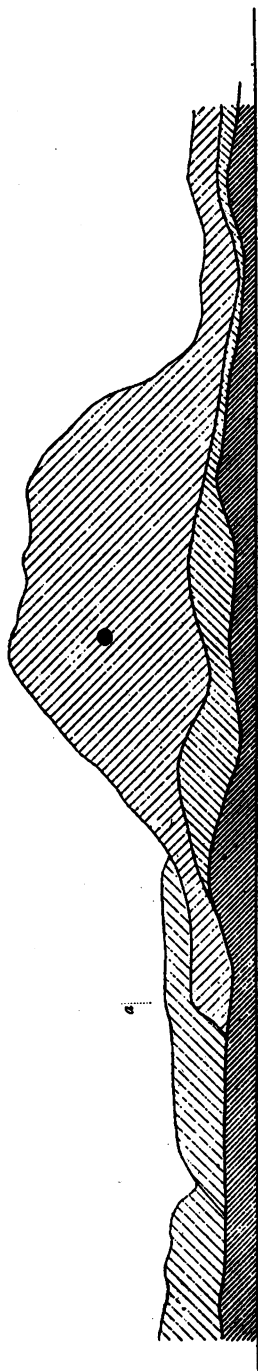
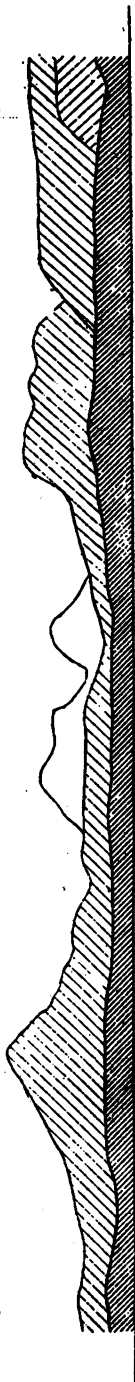
**Meteorological tables.**—For Meteorological tables *see* page 58.

*Chart 759b.*

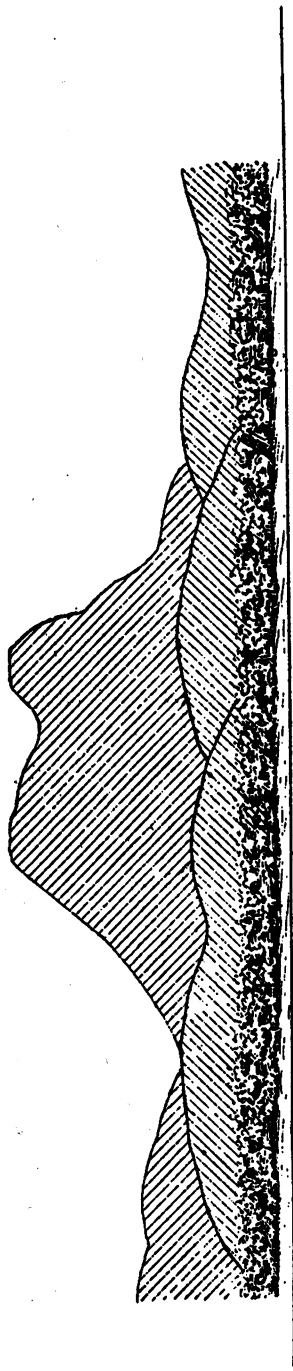
- 45 **COAST.—Aspect.**—From Tamatave the coast, which is low and covered with trees, the nearest ridge of hills being 15 miles inland, trends in a south-south-westerly direction. For a distance of about 220 miles from Tamatave there lies, between the higher land and the coast, a chain of lagoons, called the Pangalanes, into which flow numerous  
50 streams; a barrier of sand, about 3 miles wide, fronts this chain of lagoons.

Ivondrona rivière (River Ivondro) flows into the sea about 6 miles south-westward of Pointe Hastie; its entrance is encumbered with

*Charts 759b, 2899, 597, 748a.*



View, in two parts, of approach to Mananjary from 4 miles eastward.



Approach to Mananjary from 8 miles eastward.

To face page 307.



240°.

*La Selle de  
Vatmandry,  
bearing 268°.*

*Conspicuous  
black islet,  
bearing 270°.*

208°.

Coast northward of Vatmandry.

(Original dated 1923.)

*Chart 759b.*

sandbanks. The village of Ivondrona (*Lat. 18° 13' S., Long. 49° 22' E.*) stands on the northern side of the entrance.

Several small rivers flow into the sea between the mouth of Ivondrona rivière and Andevorante, about 44 miles south-south-westward. 5

Andevorante is a village on the northern side of the mouth of Rivière Iaroka, and is the capital of the province of that name; on the southern side of the mouth of this river is Tanimandry, a sugarloaf hill. Northward of Andevorante stands a large yellow two-storied house, the southern gable of which is painted green; it is in line with Tanimandry when bearing 258°. The mouth of Rivière Iaroka makes a large gap in the sandhills forming the coast, and is in line with Tanimandry when bearing 340°; breakers extend some distance off the river mouth, and their spray is visible from a distance of 10 miles seaward. 15

The village of Ananalava stands on the coast about 11 miles south-south-westward of the mouth of Rivière Iaroka; among the hills near the coast, southward of Ananalava, a white patch, like a long road descending towards the sea, may be seen from a distance of 8 miles, especially from southward. 20

A conspicuous black islet (*see view facing this page*) lies close offshore at the entrance to a channel communicating with Lac Varenta, one of the lagoons mentioned on page 306, about 3½ miles southward of Ananalava.

La Selle de Vatomandry (*see view facing this page*), which is a good landmark, is the name given to the ridge of mountains situated about 12 miles north-westward of Vatomandry, a village about 12 miles south-south-westward of Ananalava; it has several summits presenting the same characteristics, and appears as a tableland when seen from northward, but saddle-shaped from eastward or southward; it attains an elevation of 1,695 feet (516<sup>m</sup>6). 30

**Currents.**—Caution is necessary in navigating along this coast on account of the currents, which sometimes set northward and sometimes southward; the set of these currents cannot be predicted.

The average current between Tamatave and Mahanoro, about 110 miles south-south-westward, sets south-south-westward along the coast, at a rate of about 1½ knots. 35

*Chart 688.*

**Off-lying islets and dangers.**—Récif du Sud (South reef), with a least depth of 1½ fathoms (3<sup>m</sup>2) over it, the northern extremity of which lies about 4 cables west-south-westward of Pointe Hastie, extends about 8 cables south-south-westward; the sea always breaks over this reef. During the north-east monsoon there is smoother water between Récif du Sud and the coast, than there is on the northern side of Pointe Hastie. 45

*Chart 759b.*

A rock, with a depth of 12 feet (3<sup>m</sup>7) over it, lies about 6 miles south-south-westward of Pointe Hastie and one mile offshore.

Nosy Faho, a sandbank lying about 9 miles southward of Pointe Hastie (*Lat. 18° 10' S., Long. 49° 26' E.*) and 3 miles offshore, is surrounded by a coral reef, which is awash, steep-to, and over which the sea always breaks; it can be distinguished from the islets southward of it by a black rock standing on the middle of it, which looks like a wreck from a distance. 50

*Chart 759b.*

Nosy Dombala is a sandbank lying about  $7\frac{1}{2}$  miles southward of Nosy Faho; coral reefs, over which the sea usually breaks, extend about 2 miles northward and a short distance eastward of this sand-  
 5 bank. A coral bank extends from the northern end of this reef towards Nosy Faho, and can be distinguished by the discoloured water over it.

The passage between Nosy Faho and Nosy Dombala is not recommended, but if a vessel is obliged to attempt it she should keep close to Nosy Faho.

- 10 In 1915, s.s. *Sidon* reported obtaining a depth of  $12\frac{1}{2}$  fathoms ( $22^m9$ ) about  $6\frac{1}{2}$  miles eastward of Nosy Dombala.

Nosy Fonga, about one mile south-south-westward of Nosy Dombala, is a low sandy islet surrounded by a coral reef, which is steep-to, and over which the sea breaks.

- 15 The passage between Nosy Dombala and Nosy Fonga should never be attempted, even in the finest weather.

A bank was reported by H.M.S. *Tourmaline*, in 1884, to have a depth of 6 fathoms ( $11^m0$ ) over it; it lies about 6 miles offshore 17 miles south-south-westward of Nosy Fonga. The sea breaks over this bank

- 20 in heavy weather.

A shoal, with a depth of 52 feet ( $15^m8$ ) over it, was reported, in 1923, to lie about 5 miles southward of the bank just described; this shoal has not been examined and less depths may exist over it.

- Breakers were reported, in 1931, about 28 miles south-south-west-  
 25 ward of Nosy Fonga and 6 miles offshore; in 1912, the sea was reported to break during heavy weather in several places about 44 miles south-south-westward of Nosy Fonga and from 6 to 7 miles offshore.

*Chart 688.*

- Anchorage.**—Anchorage can be obtained by small vessels west-  
 30 ward of Récif du Sud and about a quarter of a mile offshore.

*Chart 759b.*

There is good anchorage, with smooth water, westward and under the lee of the off-lying islets and reefs described above; the sea is calm there during south-easterly winds.

- 35 Westward of Nosy Dombala there is anchorage in depths of 59 feet ( $18^m0$ ), sand, good holding ground.

*Chart 680, plan of Vatomandri.*

- Vatomandry.**—Vatomandry (Lat.  $19^{\circ} 20' S.$ , Long.  $49^{\circ} 00' E.$ ), situated at the mouth of Rivière Marolo, may be identified by the  
 40 red roofs of the European houses, near which stands a flagstaff, with a light-beacon 2 cables farther eastward.

- The entrance to the river is subject to frequent changes, and communication with the shore is sometimes interrupted; if landing is practicable, it can be effected in native craft, which can be summoned  
 45 by means of the International Code of Signals.

**Abnormal magnetic variation.**—Abnormal magnetic variation, when in shallow water, may be experienced in this neighbourhood.

- Current.**—The current in the offing is variable and strong, sometimes setting northward, but more frequently southward. In the  
 50 roadstead the south-going current is usually strong.

**Light.**—A light is occasionally exhibited, at an elevation of 52 feet ( $15^m8$ ), from an octagonal masonry tower, 43 feet ( $13^m1$ ) in height, painted in white and black horizontal bands, situated on the coast at Vatomandry, about 2 cables eastward of the flagstaff near the village.

*Charts 759b, 2899, 597, 748a.*

*Chart 680, plan of Vatomandri.*

**Dangers.**—Banc de Neuf Mètres, with a least depth of 29 feet (8<sup>m</sup>8) over it, and Banc Nord, with a depth of 33 feet (10<sup>m</sup>1), lie about 2 and 1½ miles, respectively, east-north-eastward of Vatomandry light-tower.

Rochers du Large, two rocks, awash, lie on a shallow bank about 1½ miles east-south-eastward of Vatomandry light-tower; the sea breaks over this reef.

Rochers Noirs lie off the mouth of Rivière Marolo; the northernmost rock, about 5½ cables east-south-eastward of Vatomandry light-tower, 10 is 20 feet (6<sup>m</sup>1) high, and conical.

Rocks, sunken and awash, lie within about 3½ cables southward of Rochers Noirs.

*Charts 680, plan of Vatomandri; 759b.*

Other reefs have been reported to exist, lying from 2 to 5 miles 15 south-eastward of Rochers du Large. Shoals have also been reported from one to 2 miles from Rochers Noirs, but their exact positions are not known.

**Directions.—Anchorages.**—A vessel approaching from northward should steer for La Selle de Vatomandry, *see* view facing page 307, 20 bearing about 250°, until the conspicuous black islet, about 8 miles northward of Vatomandry is identified. The northern Rocher Noir should then be steered for, bearing 200°, and anchorage taken up in depths of from 49 to 52 feet (14<sup>m</sup>9 to 15<sup>m</sup>8), about 4 cables from the rock; the least depth in the approach, in 1936, was 42 feet (12<sup>m</sup>8). 25

A vessel approaching from eastward should bring Vatomandry light-tower in line with the flagstaff near the village, bearing 266°, which leads between the dangers on either hand towards the anchorage.

A vessel approaching from southward is recommended to give the coast a wide berth, and follow the directions given for approaching 30 from northward. A vessel, with local knowledge, may pass close south-westward of Rochers du Large.

Anchorage can also be obtained in depths of 49 feet (14<sup>m</sup>9) with a conspicuous tree on the coast, about 3½ cables northward of Vatomandry light-tower (*Lat.* 19° 20' S., *Long.* 49° 00' E.), bearing 277°, 35 and the coast, open north-westward of Rochers Noirs, bearing 221°.

Small vessels can anchor closer inshore with the flagstaff in line with the Residency, bearing 266°.

The holding ground in the roadstead consists of sand and mud, good holding ground, but there are scattered patches of coral, which should 40 be avoided. There is always a heavy sea here, and the current, causing a vessel to ride broadside on to the swell, makes her roll heavily, especially with easterly winds.

*Chart 680, plan of Vatomandri.*

**Port limits.**—Port limits have been established; information concerning these limits may be obtained from the authorities, on arrival.

**Signal station.—Storm signals.**—There is a signal station with which vessels can communicate by day.

Signals indicating the locality threatened by a cyclone, *see* page 27, 50 are displayed.

**Communication.**—The village is connected with the general telegraph and telephone system.

*Chart 759b.*

**Coast.—Aspect.**—From Vatomandry the coast, which is low and

*Charts 759b, 2899, 597, 748a.*

*Chart 759b.*

bordered by trees, trends about 35 miles south-south-westward to Mahanoro; it is intersected by the mouths of several rivers.

On the second ridge, a short distance inland, are some conspicuous hills, among which is Colline Ronde, 786 feet (239<sup>m</sup>6) high, conical, of a dark colour, and situated about 24 miles south-westward of Vatomandry.

La Selle de Betsizaraina (Betsizaraina Saddle), about 15 miles westward of Mahanoro, is, 1,760 feet (536<sup>m</sup>4) high; its summit is slightly hollowed at the centre. When seen from northward of Mahanoro its profile appears against the sky behind the hills of the second ridge; from southward it shows a dark outline against a background of distant mountains.

In clear weather the sharp isolated peak of Vohitrakoholahy (not shown on chart), about 50 miles westward of Mahanoro, attains an elevation of 5,697 feet (1,736<sup>m</sup>4), and is conspicuous from eastward of that village.

**Off-lying dangers.**—Banc de Sept Mètres, with a least depth of 23 feet (7<sup>m</sup>0) over it, lies about 2½ miles south-eastward of Vatomandry light-tower, and Banc Sud, with a depth of 32 feet (9<sup>m</sup>8), about 1½ miles farther south-eastward; these shoals lie about 1½ and 3 miles offshore, respectively.

Banc du Vaudreuil, with a depth of 16 feet (4<sup>m</sup>9), coral, lies about 10 miles south-south-westward of Vatomandry and half a mile off-shore.

A shoal, with a depth of 26 feet (7<sup>m</sup>9) over it, is charted 7 miles north-eastward of Mahanoro, and another, with a depth of 13 feet (4<sup>m</sup>0), about 3 miles in the same direction; the latter was searched for by H.M.S. *Marathon*, in 1895, and regular soundings of 7½ fathoms (13<sup>m</sup>7) found at the spot indicated. Capt. Denis, of the *Hugon*, states that no such shoals exist, and that, with the exception of Banc du Vaudreuil, the whole coast from Vatomandry (Lat. 19° 20' S., Long. 49° 00' E.) to Mahanoro is clear of dangers, and may be coasted along close-to, passing, if necessary, inside Banc du Vaudreuil, though it is safer to pass outside it.

*Chart 680, plan of Mahanoro.*

**Mahanoro.**—Mahanoro village stands on a wooded peninsula forming the eastern side of a river which flows into the sea from a broad expanse of shallow lagoon; the peninsula appears as a quoin, the highest part being the western; from a distance it appears as an island. The European settlement lies on the western side of the river mouth; the Residency, situated on a hill on the eastern side of the mouth of the river, is conspicuous from north-eastward.

The river flows into the sea over a bar, immediately westward of the peninsula. The bar is liable to shift; it is usually only possible to communicate with the shore by means of native boats, which can be summoned by means of the International Code of Signals, but in very calm weather ships' boats can go alongside the north-western extremity of the peninsula, which is the only place where, when the sea outside is calm, the surf is slight.

A heavy sea from south-eastward sets into the anchorage and is so heavy in June and July as often to interrupt communication with the shore for several days consecutively.

**Abnormal magnetic variation.**—Abnormal magnetic variation

*Charts 759b, 597, 748a.*

*Chart 680, plan of Mahanoro.*

may in places be experienced, when in shallow water in this neighbourhood.

**Light.**—A light, the position of which is approximate, is occasionally exhibited, at an elevation of 42 feet (12<sup>m</sup>8), from a white concrete pillar, 6 feet (1<sup>m</sup>8) in height, situated about 3½ cables eastward of the north-western end of the peninsula.

**Beacons.**—A diamond-shaped beacon, painted white, is situated near the coast, about 1½ miles north-north-westward of the light-structure on the peninsula; a triangular beacon, painted in black and white horizontal bands, stands on the coast about one cable east-south-eastward of the former beacon. A small beacon, painted black and white, is situated on the coastal reef about half a cable eastward of the black and white triangular beacon.

A small diamond-shaped beacon, painted white, stands on the coastal reef, about 2½ cables west-north-westward of the light-structure on the peninsula.

**Dangers.**—A chain of reefs extends about 2½ miles north-eastward from the north-eastern side of the peninsula; the sea breaks continuously, even in fine weather, for about 1½ miles, and over the shoaler patches beyond that, but it is not often seen to break for more than 2 miles offshore. Caution must be observed in passing these reefs, and also the position of the reported dangers still farther north-eastward.

*Charts 680, plan of Mahanoro; 759b.*

**Directions.—Anchorages.**—A vessel should only approach the anchorage off Mahanoro (Lat. 19° 54' S., Long. 48° 49' E.) during the daytime, and it is advisable not to attempt leaving the anchorage at night.

A vessel approaching from northward should keep inside the reefs, and bring a white tree, standing about 200 feet (61<sup>m</sup>0) southward of the small white beacon on the coastal reef, in line with the highest tree, situated 500 feet (152<sup>m</sup>4) south-south-westward of the white tree, bearing 201°, and anchor in depths of from 29 to 31 feet (8<sup>m</sup>8 to 9<sup>m</sup>4) when the stranded wreck lying on the coastal reef 3½ cables northward of the small black and white beacon, mentioned above, bears about 272°.

There is also anchorage on the same leading line in depths of from 23 to 24 feet (7<sup>m</sup>0 to 7<sup>m</sup>3) with the two black and white beacons in line, bearing 278°.

Anchorage may be obtained in depths of from 16 to 18 feet (4<sup>m</sup>9 to 5<sup>m</sup>5) with the small white beacon close northward of the peninsula in line with the highest tree, bearing 198°, and the beacons on the coast in line, bearing about 300°.

A vessel coming from southward should round the northern end of the reefs and proceed as directed above.

Large vessels may obtain anchorage in depths of 62 feet (18<sup>m</sup>9), sand and mud, with the beacons on the coast in line, bearing about 300°, and a house, with a red roof, standing on the western side of the entrance to the river, in line with La Selle de Betsizaraina (page 310), bearing about 267°. This anchorage is exposed to the swell.

*Chart 680, plan of Mahanoro.*

The landing place is on the beach, on the left bank of the river, just within its entrance; there is a small wooden pier here. Com-

*Charts 759b, 597, 748a.*



*Charts 680, plan of Mahanoro.*

munication with the shore is usually by means of native boats, but in very fine weather ships' boats can cross the bar.

**Port limits.**—The limits of the port are as follows:—

- 5 From a position on the high water line 097° distant 3 cables from the flagstaff on the north-western end of the peninsula, a line drawn in an 080° direction for a distance of 8½ cables, thence in an 000° direction for 25½ cables, thence in a 270° direction for 11½ cables and thence in a 184° direction for 22½ cables to the high water line in a position 335° distant 4½ cables from the flagstaff mentioned above.

**Communications.**—There is steamer communication with the other Madagascan ports.

There is telephonic communication with Tamatave.

- Port facilities.**—Fresh meat and vegetables are obtainable ; rice is 15 plentiful.

There are some lighters belonging to private companies.

**Signal station.**—**Storm signals.**—There is a signal station at Mahanoro, with which vessels can communicate by day.

- Signals indicating the locality threatened by a cyclone, *see* page 27, 20 are displayed at Mahanoro.

*Chart 759b.*

**Coast.**—**Aspect.**—**Dangers.**—From Mahanoro (*Lat. 19° 54' S., Long. 48° 49' E.*) the coast trends about 85 miles south-south-westward to Mananjary.

- 25 Rivière Mangoro, which flows into the sea about 6 miles south-south-westward of Mahanoro light-structure, is the largest river on the eastern side of Madagascar ; its entrance is obstructed by rocks and breakers, but southward of these rocks there is said to be a passage available for small vessels with local knowledge. Fort de Betsizaraina 30 stands on the northern side of the entrance.

The muddy waters of the Mangoro sometimes extend a long distance seaward, and their colour presents so strong a contrast to the sea proper, as might cause apprehension of shoal water. There is no known danger, the depths being very great.

- 35 Southward of the mouth of Rivière Mangoro the coast is low and bordered with trees, chiefly casuarinas, within which is a range of slightly wooded hills.

- The village of Ambinasakaleo, about 35 miles south-south-westward of the mouth of Rivière Mangoro, is situated on the northern side of 40 a gap in the coast, where several streams flow into the sea ; these streams unite a little inland, joining Rivière Sakaleona. The village of Nosivarika stands on the southern side of this delta.

- The trees bordering the coast disappear here and, in clear weather, Pain de Sucre (Sugar Loaf), 1,704 feet (519<sup>m</sup>4) high, with a conspicuous 45 sugarloaf summit, about 16 miles westward of Ambinasakaleo, may be seen, identifying the entrance to Rivière Sakaleona.

From this part of the coast the hills diminish in elevation southward. and the last, a summit of no great elevation, presents the appearance of the teeth of a saw.

- 50 About 8 miles southward of the mouth of Rivière Sakaleona the trees near the coast are gradually displaced by bushes.

A branch of the Sakaleona runs southward parallel with the coast, and joins the mouth of the Fanantara 13 miles farther southward ; from this river again a branch continues along close within the coast to

*Charts 759b, 597, 748a.*

*Chart 759b.*

the village of Mahéla, and thence by lagoon to within about 3 miles of Rivière Mananjary. On a tongue of sand extending from the right bank of the Fanantara stands Ambohitsara village.

Mahéla can be identified by a row of casuarina trees which borders the coast northward of this village and extends south-westward of it. 5

Between Mahéla and Mananjary, the coast is bordered by shrubs and brushwood, above which a small tree rises here and there; the land within, though not low, presents no noticeable feature. For 3 or 4 miles northward of the mouth of Rivière Mananjary, behind the white sandy beach, the coast is bordered by a dense row of casuarina trees, whilst southward of the river there is only brushwood, with here and there small clumps of trees. 10

Mananjary (*see* views facing page 306), on the northern side of the mouth of the river (*Lat.*  $21^{\circ} 16' S.$ , *Long.*  $48^{\circ} 20' E.$ ) of the same name, 15 may be identified by three clumps of casuarina trees; the southern is situated on the right bank of the river, the middle on the sandy point on which the town stands, and the third clump, which is darker and more regular in shape, standing a little northward of, and quite isolated from, the other two, is visible even at night. There are two flagstuffs 20 in the town, the highest and southernmost standing at the Residency; the Residency and other houses are conspicuous from seaward, especially in the morning. Other conspicuous landmarks are the native hospital, a large greyish building at the northern end of the town, and the water-works, with a tower, also greyish in colour. The white 25 sandy beach, and a bamboo palisade at the northern end of the town, are visible from a distance of several miles; the latter was reported, in 1934, to be inconspicuous and not visible until close to the anchorage.

Vatovavy, a mountain, 1,862 feet (567<sup>m</sup>5) high, 24 miles west-south-westward of Mananjary, is higher than the neighbouring summits, and 30 of a darkish colour. *See* view facing page 306.

Récif de Mananjary, over which the sea breaks, obstructs the entrance to Rivière Mananjary, and extends from southward of the mouth of the river in a north-north-easterly direction for about  $1\frac{1}{2}$  miles; there is a passage, available for small craft with local knowledge, from 35 northward into the river.

A detached shoal, with a depth of 15 feet (4<sup>m</sup>6) over it, lies about a quarter of a mile offshore  $4\frac{1}{2}$  cables south-eastward of the native hospital.

**Currents.**—A southerly set of  $1\frac{1}{2}$  knots was experienced, in 1944, 40 about 6 miles eastward of Mananjary, but when approaching the anchorage a strong northerly set was encountered.

**Lights.—Beacons.**—A light is occasionally exhibited at an elevation of 33 feet (10<sup>m</sup>1), from a gallows on a white hut with a black horizontal band, situated about 6 cables northward of the Residency. 45

A light is exhibited, at an elevation of 114 feet (34<sup>m</sup>7), from a grey circular water-tank on a truncated tower, 75 feet (22<sup>m</sup>9) in height, situated about  $8\frac{1}{2}$  cables north-north-westward of the light-structure described above.

Two beacons, the rear one painted in black and white vertical stripes 50 and the front one in black and white horizontal bands, which are in line bearing about  $330^{\circ}$ , stand, the front beacon southward and the rear beacon westward of the native hospital.

A white obelisk, 36 feet (11<sup>m</sup>0) in height, from which a light is

*Charts 597, 748a.*

*Chart 759b.*

occasionally exhibited, stands near the middle of the town (*Lat.* 21° 16' S., *Long.* 48° 20' E.), about 6½ cables westward of the front light ; these two lights, when in line, bear about 266°.

- 5 **Off-lying dangers.**—Gabrielle shoal, a bank of sand and coral, has for some time been believed to exist ; the schooner *Gabrielle*, in 1894, reported obtaining depths of from 3½ to 8 fathoms (6<sup>m</sup>9 to 14<sup>m</sup>6) over it about 6 miles offshore and 9 miles south-eastward of Mahéla. In 1896, the *Hugon* saw nothing of it ; its position must be considered  
10 doubtful.

Seaward of the anchorage off Mahéla there is a shoal with a depth of 3½ fathoms (6<sup>m</sup>4) over it, and depths of 15 fathoms (27<sup>m</sup>4) between it and the coast.

- Anchorage.**—**Directions.**—Anchorage may be obtained, in depths  
15 of 17 fathoms (31<sup>m</sup>1), fine red sand, but indifferent holding ground, off the entrance to Rivière Sakaleona, with Pain de Sucre bearing about 253°. The depths decrease very slowly and regularly from the anchorage towards the entrance and a depth of 5½ fathoms (10<sup>m</sup>1) was found about 2 cables outside the bar. In depths of under  
20 11 fathoms (20<sup>m</sup>1) the bottom is coral, above that depth fine red sand. Communication with the shore is difficult except when the sea is smooth.

- A vessel approaching the open roadstead at Mahéla from northward or eastward should make the land about Pain du Sucre ; thence she  
25 should coast along in depths of 8 or 9 fathoms (14<sup>m</sup>6 or 16<sup>m</sup>5) until past Ambohitsara village, whence a depth of 13 or 14 fathoms (23<sup>m</sup>7 to 25<sup>m</sup>6) should be maintained to the anchorage.

- The best berth is with the principal European house bearing between 270° and 281° in depths of 12 or 13 fathoms (21<sup>m</sup>9 or 23<sup>m</sup>8), sand and  
30 coral. Except between these bearings the bottom is foul.

This anchorage is impracticable during the south-east monsoon.

Communication with the shore is by means of decked surf boats, and should not be attempted in ships' boats or by strangers. The landing place is inside the bar.

- 35 A vessel wishing to anchor off Mananjary should approach with the light-structure bearing about 270°, and good anchorage may be obtained in depths of 52 feet (15<sup>m</sup>8) with Vatovavy bearing 244°.

- With northerly winds a vessel should anchor in depths of 7 fathoms (12<sup>m</sup>8) with the beacons in line, bearing about 330°, and the front  
40 light-structure in line with the white obelisk, bearing about 266°.

At this anchorage there is always a swell, which causes vessels to roll, especially with the prevailing south-easterly winds ; with north-easterly winds it is not so bad, but communication with the shore is more difficult.

- 45 It is not advisable to use ships' boats for landing. Lighters are available.

**Port limits.**—Port limits have been established ; information concerning these limits may be obtained from the authorities on arrival.

- Signal station.**—**Storm signals.**—There is a signal station (*Lat.*  
50 21° 15' N., *Long.* 48° 20' E.), with which vessels can communicate by day.

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed.

**Coast.**—**Dangers.**—Southward of Mananjary the coast is bordered

*Charts 597, 748a.*

*Chart 759b.*

with low bushes and casuarina trees as far as Rivière Namorona, which flows into the sea about 22 miles south-south-westward of the entrance to Rivière Mananjary; there are several huts at the mouth of Rivière Namorona. Between the entrance to Rivière Namorona and the 5 mouth of Rivière Faraony, about 11 miles south-south-westward, the coast is low and devoid of vegetation.

The mouth of Rivière Faraony is barred by a long line of reefs, awash, over which the sea breaks heavily.

*Chart 760.*

10

From the entrance to Rivière Faraony to that of Rivière Matitanana, about 40 miles south-south-westward, the coast is covered with vegetation less dense than that farther northward.

Rocher Ambataloborona (Ambatovorona), lying close offshore about 9 miles south-south-westward of the entrance to Rivière Faraony, and 15 the tall casuarina trees at the mouth of Rivière Mananano, which flows into the sea about 14 miles south-south-westward of the entrance to Rivière Faraony, are conspicuous.

*Chart 759b.*

**Anchorage.**—Two channels, with depths of 15 feet (4<sup>m</sup>6), lead to an 20 anchorage within the reefs fronting the mouth of Rivière Faraony, where there are reported to be depths of 19 feet (5<sup>m</sup>8); these two channels are dangerous except in very fine weather, and are only practicable for decked native boats.

*Charts 680, plan of Manakara anchorage; 760.*

25

**Manakara.**—The village of Manakara is situated at the mouth of a river of the same name; the mouth of Rivière Manakara, unlike most estuaries on this coast, does not shift. Rivière Riana flows into Rivière Manakara, on the northern side of its mouth.

*Chart 680, plan of Manakara anchorage.*

30

**Landmarks.**—Two groups of houses, one on either side of the mouth of Rivière Manakara, known as Manakara Nord (North Manakara) and Manakara Sud (South Manakara), respectively, are good landmarks, especially in the morning.

The village of Emokala is situated about 1½ miles northward of 35 Manakara Nord and half a mile inland; a light-tower stands at the southern end of this village.

Other conspicuous objects are three large buildings, about half a mile southward of this light-tower, two of which have red roofs, and the third, a short distance southward, with its roofing painted in black 40 and white vertical stripes, with a factory chimney on its western side, also three trees, about 40 yards (36<sup>m</sup>6) apart, with their trunks painted white, standing close to the coast east-south-eastward of the factory chimney; a stranded wreck lies about one cable offshore east-south-eastward of these trees.

45

A flagstaff stands close to the coast at the north-eastern end of Manakara Nord (Lat. 22° 07' S., Long. 48° 03' E.).

On the north-western bank of Rivière Manakara, about a quarter of a mile west-south-westward of the flagstaff is the railway station, a rectangular cement building.

50

Manakara Sud has several red-roofed houses, and near the coast about half a mile south-south-eastward of the railway station is a house with a pointed roof; farther southward are the Treasury and the Residency. On the water-tower, near the latter, is a light-structure.

*Charts 760, 597, 748a.*

*Chart 680, plan of Manakara anchorage.*

**Lights.—Beacons.**—A light is exhibited at an elevation of 144 feet (43<sup>m</sup>9) from an octagonal tower, painted in black and white horizontal bands, 82 feet (25<sup>m</sup>0) in height, situated at the southern end of Emokala.

- 5 A pyramidal beacon, 49 feet (14<sup>m</sup>9) in height, stands near the coast about 6½ cables east-north-eastward of the light-tower at Emokala; care must be taken not to confuse this beacon with the light-tower, as both are painted in black and white horizontal bands.

- No. 9 beacon, painted red and white, is situated about 2 cables south-south-eastward of Emokala light-tower; this beacon and light-tower, when in line, bear about 312°.

- No. 1 beacon, a triangular shape, painted white with a black cross, on the roof of a building, is situated about 3½ cables south-westward of No. 9 beacon; No. 2 beacon, a triangular shape, painted white with a black St. Andrew's cross, on a concrete support, stands near the coast about 3½ cables south-eastward of No. 1 beacon.

- No. 4 beacon, from which a light is exhibited at an elevation of 26 feet (7<sup>m</sup>9), consists of an octagonal tower, painted in black and white horizontal bands, 13 feet (4<sup>m</sup>0) in height, situated on the coast about 3 cables south-south-westward of No. 2 beacon; No. 3 beacon, from which a light is exhibited at an elevation of 59 feet (18<sup>m</sup>0), consists of an octagonal tower, painted in black and white horizontal bands, 36 feet (11<sup>m</sup>0) in height, situated about 4½ cables west-north-westward of No. 4 light-beacon.

- 25 No. 6 beacon stands near the coast about 2 cables southward of No. 4 light-beacon; No. 5 beacon is situated close west-south-westward of No. 6 beacon.

*Chart 760.*

- A light is exhibited at an elevation of 82 feet (25<sup>m</sup>0) from a concrete column on a water-tower, 72 feet (21<sup>m</sup>9) in height, situated near the coast about one mile southward of No. 4 light-beacon.

*Chart 680, plan of Manakara anchorage.*

- Dangers.**—Récif du Large, a chain of shoals, with depths of less than 6 feet (1<sup>m</sup>8) over it, extends, parallel to the coast and about three-quarters of a mile offshore, from a position east-north-eastward of Emokala to a position south-eastward of Manakara Sud; a detached shoal, with a depth of 28 feet (8<sup>m</sup>5), lies about one mile east-south-eastward of the flagstaff at Manakara Nord.

- Récif Intermédiaire, within Récif du Large, extends in a parallel direction to this reef to a position south-eastward of Manakara Sud (Lat. 22° 08' S., Long. 48° 03' E.); Rocher Plat, lying on Récif Intermédiaire, about 4½ cables eastward of the flagstaff at Manakara Nord, is a black flat rock, which is not easily identified when the sea breaks over it.

- 45 A ledge of rocks extends in a north-north-easterly direction across the entrance to Rivière Manakara, and terminates in Rocher Noir or Rocher Double (Black rock), a rock, 5 feet (1<sup>m</sup>5), high, lying about 3 cables westward of Rocher Plat; some rocks, awash, lie close northward of Rocher Noir. Rocher Pyramide is situated on this ledge, about 1½ cables southward of Rocher Noir.

**Abnormal magnetic variation.**—Abnormal magnetic variation is experienced when approaching this anchorage.

**Anchorage.—Channels.—Directions.**—There is anchorage, in depths of from 46 to 52 feet (14<sup>m</sup>0 to 15<sup>m</sup>8), with Nos. 3 and 4 light-

*Charts 760, 597, 748a.*

*Chart 680, plan of Manakara anchorage.*

beacons in line, bearing about  $286^{\circ}$ , and the light-structure at Manakara Sud bearing  $241^{\circ}$ ; also in depths of from 46 to 49 feet ( $14^m0$  to  $14^m9$ ), with Nos. 1 and 2 beacons in line, bearing  $312^{\circ}$ , and the light-structure at Manakara Sud bearing  $246^{\circ}$ .

Two channels, each about a cable wide, with least depths of 17 feet ( $5^m2$ ), and separated from one another by Récif Intermédiaire, lead to the natural harbour at the mouth of Rivière Manakara; these two channels join about  $1\frac{1}{2}$  cables north-north-eastward of Rocher Plat.

There is a gap in Récif du Large, about  $1\frac{1}{2}$  miles eastward of the light-tower at the southern end of Emokala; this light-tower, bearing  $267^{\circ}$ , leads through it in a least depth of 17 feet ( $5^m2$ ). A heavy swell, however, may be experienced here, which might cause a vessel to touch the ground.

The inner anchorage in the natural harbour at the mouth of Rivière Manakara is only practicable for small vessels with local knowledge. A vessel wishing to proceed to this anchorage should steer through the gap in Récif du Large, described above, until Rocher Pyramide bears  $212^{\circ}$ , when it should be steered for on that bearing; care must be taken on account of wind and tide to avoid a detached shoal, with a least depth of 16 feet ( $4^m9$ ) over it, lying about  $3\frac{1}{2}$  cables north-eastward of Rocher Noir, as the track passes only about a quarter of a cable north-westward of it. This channel should only be used if the sea is not breaking over Récif Intermédiaire.

When Nos. 3 and 4 light-beacons are in line, bearing about  $286^{\circ}$ , course may be altered southward for an anchorage, in depths of 30 feet ( $9^m1$ ), situated  $1\frac{1}{2}$  cables eastward of Rocher Noir.

Nos. 5 and 6 beacons in line, bearing about  $250^{\circ}$ , lead into the natural harbour where there is anchorage in depths of from 11 to 14 feet ( $3^m4$  to  $4^m3$ ).

Landing can be effected, in calm water, at a quay on the left bank of the river.

**Port limits.**—The limits of the port (Lat.  $22^{\circ} 07' S.$ , Long.  $48^{\circ} 04' E.$ ) are approximately as follows:—

From a position  $180^{\circ}$  distant 7 cables from Rocher Noir, a line drawn in an  $090^{\circ}$  direction for a distance of 12 cables, thence in an  $000^{\circ}$  direction for  $20\frac{1}{2}$  cables and thence in a  $270^{\circ}$  direction to the shore.

**Facilities.**—There is a quay, about 426 feet ( $129^m8$ ) long, on the left bank of the river; on it is a 6-ton steam crane. Several lighters are available. In 1937, two tugs could be hired from the railway construction company.

**Signal station.**—**Storm signals.**—There is a signal station at Manakara with which vessels can communicate by day.

Signals indicating the locality threatened by a cyclone, see page 27, are displayed.

*Chart 760.*

**Coast.**—**Aspect.**—**Dangers.**—**Anchorage.**—Between Manakara and Farafangana, about 43 miles south-south-westward, the coast is low and wooded, and has no conspicuous features. The mountains of the interior are only visible in exceptionally clear weather. A regular tableland, formed by a wooded plateau, about 10 miles northward of Farafangana, is a good mark for identifying that place from northward.

Southward of Manakara a river flows close within the coast as far as Ampasimeloka, a village about 16 miles south-south-westward.

*Charts 760, 597, 748a.*

*Chart 760.*

Rivière Matitanana forms a large estuary, the mouth of which, about 3½ miles southward of Ampasimeloka, is completely obstructed by breakers extending about half a mile offshore.

- 5 There are several hummocks northward of the mouth of this river, and on the plain westward stands a large isolated hill. From seaward a village and a settlement are visible.

- From 4 to 5 miles southward of the mouth of Rivière Matitanana a barrier reef extends parallel with the coast for 8 or 9 miles, about half  
10 a mile offshore; there are several openings in this reef, only available for native boats. There is, however, a passage near the northern end of the reef, which has been used by vessels of 400 tons; within this passage anchorage may be obtained by small vessels with local knowledge off Andranamby, or other villages on the coast.

- 15 Rivière Mahitsy flows into the sea about 15 miles southward of the mouth of Rivière Matitanana; the village of Nosikely stands on a grey hill on the southern side of the mouth of this river, but it is not visible from seaward being shut in by trees.

- There is anchorage in depths of about 8 fathoms (14<sup>m</sup>6) eastward of  
20 Nosikely and northward of a large black rock. Passengers can be embarked here when the weather is too bad at Farafangana.

*Chart 680, plan of Farafangana anchorage.*

- Farafangana.—Landmarks.**—The estuary, on the southern side of which stands the town of Farafangana, is enclosed by large trees on  
25 its northern and eastern sides; it forms the mouth of several rivers including the Manambavana, the Manampatra, and the Manambato. During heavy rains the water from these rivers discolours the sea for 4 or 5 miles offshore, and possibly much farther, as discoloured water is reported to have been met with 14 miles south-eastward, and  
30 again in 1897, 12 miles eastward of Farafangana (*Lat.* 22° 49' S., *Long.* 47° 50' E.). The bar of this estuary frequently changes, and the sea always breaks heavily over it; it is impracticable in bad weather.

The village of Ambaniou is situated close southward of Farafangana.

- The estuary may be identified by Sommet Mahabo, 127 feet (38<sup>m</sup>7),  
35 high, situated about 2½ miles south-westward of the mouth of Rivière Manampatra, and by the clumps of casuarina trees which surround the town, and are visible from a distance; they form a rectangle, the dark colour of which contrasts with the vegetation of the second ridge. The summit of Sommet Mahabo, being bare, cannot be confused with  
40 any other hill.

- Other conspicuous landmarks are several houses in the town, a white flagstaff situated in the northern part of the town, near the Custom house, and the slaughter-house, an isolated red building with a grey roof, standing in the northern part of Ambaniou, which in fine weather,  
45 and especially in the early morning, is visible from a distance of 12 miles.

**Current.**—The current usually sets south-south-westward at a rate of from one to 2½ knots.

- Lights.—Beacons.**—Two pairs of leading lights are occasionally exhibited at Farafangana, one pair situated northward of the town  
50 and the other southward. The front light of the northern pair is exhibited from a beacon, surmounted by a triangle, 39 feet (11<sup>m</sup>9) in height, painted in black and white horizontal bands, situated on the western bank of Rivière Manampatra, about 7½ cables north-westward of the conspicuous flagstaff; the rear light is exhibited from a beacon,

*Charts 760, 597, 748a.*

*Chart 680, plan of Farafangana anchorage.*

surmounted by a rectangle, 39 feet (11<sup>m</sup>9) in height, painted in black and white horizontal bands, situated about 3¼ cables westward of the front light; this latter beacon is known as Mayeux beacon. The front light-beacon is masked by trees when bearing more than 325°. 5

The front light of the southern pair is exhibited from a beacon, 30 feet (9<sup>m</sup>1) in height, situated on the slaughter-house; the rear light of this pair is exhibited from a beacon, surmounted by a rectangle, 39 feet (11<sup>m</sup>9) in height, painted in black and white horizontal bands, situated about 3¼ cables south-westward of the front light. These 10 two beacons are named, respectively, Abattoir and Carbonnier; Carbonnier beacon is masked by trees between the bearings of 280° and 300°.

Le Page beacon, surmounted by a rectangle painted in black and white horizontal bands, stands on the coast about a mile north-east- 15 ward of the front light of the northern pair of leading lights. This beacon was reported destroyed, in 1945.

Le Page, Mayeux, and Carbonnier beacons being somewhat alike, care must be exercised in misty weather, not to mistake one for the other. 20

**Abnormal magnetic variation.**—Abnormal magnetic variation is experienced when approaching this anchorage.

**Directions.—Anchorage.**—If the weather is not sufficiently clear to identify the beacons (*Lat. 22° 48' S., Long. 47° 49' E.*) when a vessel arrives in depths of 14 fathoms (25<sup>m</sup>6), it is better to anchor. In fine 25 weather the sea does not always break over the outer reefs.

The main anchorage is 2½ cables from the reefs, in depths of 49 feet (14<sup>m</sup>9), with Abattoir and Carbonnier light-beacons in line, bearing 230°, and the northern pair of light-beacons in line, bearing 280°; the holding ground is poor, and a south-south-west-going current 30 generally holds a vessel across a heavy south-easterly swell. At night it is prudent, if the wind threatens to increase, to leave this anchorage, and proceed to sea until the morning.

Carbonnier anchorage is inside the outer reefs, about one mile south-south-eastward of Le Page beacon, in depths of 33 feet (10<sup>m</sup>1). A vessel 35 making this anchorage should steer towards the shore with Le Page beacon bearing 260°, remembering that the current usually sets southward; when Abattoir light-beacon bears 199°, course can be altered south-south-westward for the anchorage, keeping on this bearing.

This latter anchorage, though more sheltered from the swell than the 40 outer anchorage, is not recommended for large vessels. The depths are irregular, and there are probably some shoal patches in the approach.

A wreck lies on the coastal reef about 4¼ cables north-eastward of Abattoir light-beacon. When the sea is breaking over this wreck it is probable that the bar is impracticable, and that there will be no 45 communication with the shore.

The landing place is at a pier on the southern bank of Rivière Manampatra.

**Port limits.**—The limits of the port are as follows:—

On the north: The parallel of Le Page beacon. 50

On the south: The parallel of the southern extremity of Ambaniou village.

On the east: The meridian of a position 090° distant 20¼ cables from Le Page beacon.

*Charts 760, 597, 748a.*



*Chart 680, plan of Farafangana anchorage.*

**Port facilities.**—Cargo is worked by means of decked native boats. Lighters are available.

**Signal station.**—**Storm signals.**—There is a signal station at the Custom house with which vessels can communicate by the International Code of Signals.

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed at Farafangana.

**Meteorological tables.**—For Meteorological tables, *see* page 59. *Chart 760.*

**Coast.**—**Aspect.**—**Dangers.**—From Farafangana the coast trends about 25 miles south-south-westward to the entrance to Rivière Mananivo; the country is well wooded.

The few dangers that exist lie close offshore and vessels, proceeding along this coast by day, can see them at a sufficient distance to enable them to be avoided.

A conspicuous tree, with three tiers of foliage, stands up above the neighbouring vegetation on the summit of a large plateau, about 6 miles south-south-westward of Farafangana (*Lat.* 22° 50' S., *Long.* 47° 50' E.), and is visible from a distance of 10 or 12 miles. The wooded plateau of Ankarana, 541 feet (164<sup>m</sup>9) high, situated on the second ridge, about 19 miles south-westward of Farafangana, is conspicuous, and appears from seaward as a large table-topped hill.

The mouth of Rivière Mananivo can be identified by the contrast between the thickly wooded country northward with the flatter country and few trees southward; the mouth itself is marked by a white square with a black disc in the middle.

A large bank, over which the sea breaks heavily when there is any swell, extends about a mile eastward of the mouth of Rivière Mananivo.

*Charts 680, plan of Vangaindrano anchorage; 760.*

The mouth of Rivière Mananara, about 7 miles south-south-westward of the entrance to Rivière Mananivo, can be identified by the breakers which are visible from some distance seaward; on the right bank of Rivière Mananara can be seen a village, formed by two quite distinct groups of houses, also two isolated houses, clearly visible, situated slightly northward of the tongue of sand at the river mouth. *See* view facing this page.

The mouth of Rivière Mananara was reported, in 1934, to lie farther southward than is shown on the chart.

The village of Vangaindrano, which gives its name to the anchorage situated at the mouth of Rivière Mananara, is situated about 5 miles up the river.

*Chart 760.*

**Anchorage.**—**Beacons.**—There is anchorage in depths of 18 fathoms (32<sup>m</sup>9), sand, about 3 miles offshore, off the mouth of Rivière Mananivo, with the southern fall of Ankarana bearing 313°. Vessels wishing to work cargo must proceed closer inshore. There is a landing place at the entrance to the river in front of a small village.

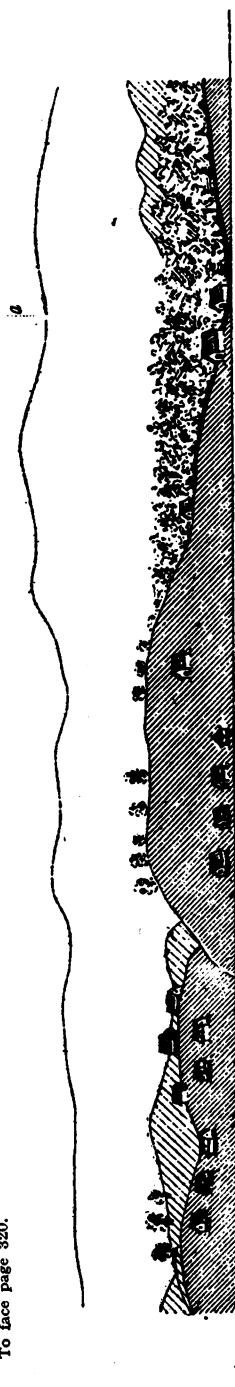
There is anchorage in depths of from 16 to 18 fathoms (29<sup>m</sup>3 to 32<sup>m</sup>9) off the mouth of Rivière Mananara; vessels wishing to communicate with the shore must anchor farther in, but caution is necessary.

*Chart 680, plan of Vangaindrano anchorage.*

There is anchorage in depths of from 46 to 52 feet (14<sup>m</sup>0 to 15<sup>m</sup>0) about three-quarters of a mile offshore, with the beacons on the

*Charts 760, 597, 748a.*

To face page 320.



Village,  
bearing 200°.

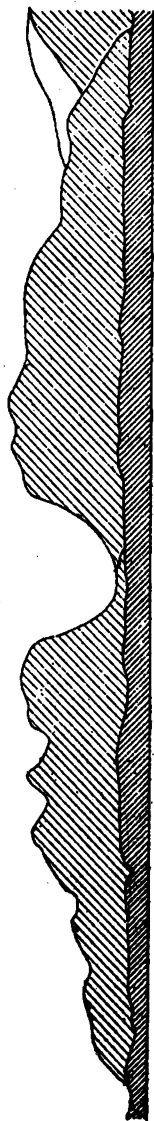
Rivière Mananara.



Rivière Mananara.

Tableland.

View, in two parts, of approach to Rivière Mananara from eastward.  
(Original dated prior to 1934.)



*Torotoro,*  
bearing 256°.

*V-shaped*  
*gap.*

*Sakarivo.*

Sakarivo and Torotoro from eastward.



*Piton Saint-Louis,*  
bearing 230°,  
distant 40 miles.



View, in two parts, of approach to Fort Dauphin.  
(Original dated prior to 1934.)

*Chart 680, plan of Vangaindrano anchorages.*

northern side of the river in line, bearing about  $335^{\circ}$ , and the beacons on the southern side of the river in line, bearing about  $252^{\circ}$ ; the beacons on the northern side of the river consist of triangular shapes with four horizontal panels, painted black, and those on the southern side of the river of rectangular shapes with four horizontal panels, painted white. 5

Anchorage can be obtained in depths of about 48 feet ( $14^m6$ ) with the rear beacon on the northern side of the river bearing  $350^{\circ}$  and the western beacon on the southern side of the river  $270^{\circ}$ . 10

Boats can enter Rivière Mananara in fine weather.

*Chart 760.*

**Coast.—Aspect.—Dangers.**—From the mouth of Rivière Mananara (*Lat.*  $23^{\circ} 20' S.$ , *Long.*  $47^{\circ} 42' E.$ ) the coast trends about 46 miles south-south-westward to the mouth of Rivière Isandra. The high mountains of the interior gradually approach the coast; Grande Mamelles, 3,871 feet ( $1,179^m9$ ) high, about 25 miles west-south-westward, and La Dent, about 29 miles south-westward of Vangaindrano, are two characteristic peaks which, in fine weather, are good landmarks. 15

Southward of the Mananara the coast becomes absolutely sterile, and thus continues for about 15 miles south-south-westward of the mouth of Rivière Masianaka, which flows into the sea about 15 miles south-south-westward of the mouth of the Mananara, and may be identified by some rock over which the sea always breaks; the entrance to the Masianaka is dangerous. 20 25

Rivière Manambondro flows into the sea about 14 miles south-south-westward of the entrance to Rivière Masianaka; the village of Mahabo is situated on the southern side of the entrance to Rivière Manambondro, and the village of Manambondro about three-quarters of a mile farther southward. 30

The coast in this vicinity is wooded and bordered by small hills.

The mouth of Rivière Isandra can be identified by a reef, above water and sunken, also by a clump of trees, of a darkish colour, situated just within the entrance to the river.

Southward of the entrance to the Isandra the coast is less wooded, and is bordered by hillocks in places; the inland range of mountains is closer to the coast, and one mountain has a conspicuous knob on its summit. 35

Sakarivo, a steep mountain, 1,285 feet ( $391^m7$ ) high, and the Torotoro, equally steep, are situated about 15 miles south-westward of the entrance to Rivière Isandra; the feet of these mountains appear to touch, and they form a V which closes as a vessel proceeds southward (*see* view facing this page). 40

Fenoarivo, or Le Pouce, about 3 miles north-westward of Sakarivo, attains an elevation of 2,263 feet ( $690^m0$ ), and is conspicuous. Tête mi-pelée, a hill near the coast, about 5 miles eastward of Sakarivo, is also conspicuous; its southern slopes are wooded, but its northern slopes are bare. 45

Rivière Manampanihy flows into the sea southward of Tête mi-pelée and about 13 miles south-westward of the entrance to Rivière Isandra; its entrance is obstructed by breakers, and is inaccessible. On the southern side of the entrance to Rivière Manampanihy is a cove, within some rocks, which forms a good landing place: 50

From the mouth of the Manampanihy the coast trends about 30 miles

*Chart 760.*

south-south-westward to Baie de Sainte-Luce ; it is arid and faced by low cliffs, but farther southward it becomes wooded, low, and backed by a ridge of bare hillocks a short distance inland. This part of the  
5 coast is fringed by rocks, some of which lie from  $1\frac{1}{2}$  to 2 miles offshore.

Before arriving at Baie de Sainte Luce (*Lat.  $24^{\circ} 44' S.$ , Long.  $47^{\circ} 13' E.$* ), several small conical peaks on the Itapérina peninsula, about 43 miles south-south-westward of the entrance to Rivière Manampanihy, will appear like an island, as well as two small arid hills on the  
10 southern side of Baie de Sainte-Luce.

**Off-lying bank and danger.**—A bank, with a depth of 24 fathoms ( $43^m9$ ) over it, was reported, in 1943, to lie about 8 miles south-eastward of the entrance to Rivière Isandra ; this bank has not been examined.

A rock, with a depth of less than 6 feet ( $1^m8$ ) over it, the position of  
15 which is doubtful, was reported, in 1935, to lie about 19 miles southward of Tête mi-pelée and about 7 miles offshore.

**Anchorage.**—There is anchorage about 2 miles southward of the mouth of Rivière Masianaka and  $2\frac{1}{2}$  miles offshore, abreast an isolated tree on the coast.

20 The anchorage off Manambondro is abreast a beach covered with creepers over the white sand of the shore near the landing place. It should be approached by steering for a saddle-shaped mountain in the interior, bearing  $255^{\circ}$ , until in depths of 18 fathoms ( $32^m9$ ).

The landing place at Manambondro is reported to be the best landing  
25 place on this part of the coast ; it is just southward of the village, where some rocks form a small cove.

*Chart 680, plan of Ste. Luce anchorage.*

**Baie de Sainte-Luce.**—Baie de Sainte-Luce, which is sheltered from eastward by a chain of islets and shoals, over which the sea  
30 breaks, affords shelter to small vessels. The town stands on the coast near the southern end of the bay.

This bay is open to north-easterly winds, but, though sometimes strong, they do not raise a heavy sea ; south-easterly winds, on the contrary, in spite of the shelter afforded by the islands, raise a choppy  
35 sea. The holding ground is good. During a stay of 15 days, at the worst season of the year, when a strong north-easterly wind was blowing, the French gunboat *Scorpion* lay in the inner part of the bay with her fires out, and communication with the shore was never interrupted. There is a jetty in the small bay southward of the town, where landing  
40 can be effected.

**Islets and dangers.**—The principal islets, named in order from northward, are Ile Souillac, Ile aux Oiseaux, Ile de Chartres, Ile Babet or Nosy Anihina, and Ile aux Chèvres or Nosy Bé ; these islets are low, flat, rocky, and scarcely distinguishable from the coast from a  
45 distance of 3 or 4 miles ; the sea often washes completely over them.

The *Garland* was lost, in 1798, on a rock, the position of which is doubtful ; it is shown on the plan about half a mile east-north-eastward of the northern extremity of Ile Souillac ; in 1895, the *Hugon* searched for it in vain.

50 Two shoals, each with a depth of 15 feet ( $4^m6$ ) over it, lie about  $3\frac{1}{2}$  cables, respectively, north-eastward and north-westward of the northern extremity of Ile Souillac (*Lat.  $24^{\circ} 45' S.$ , Long.  $47^{\circ} 14' E.$* ).

Westward of the islets described above are several shoals, the positions of which may best be seen on the plan.

*Charts 760, 597, 748a.*

*Chart 680, plan of Ste. Luce anchorage.*

The inner part of the harbour, near the town, is shallow and encumbered with rocks.

**Caution.**—Owing to the existence of several dangers in the approach, the exact positions of which are not known, vessels without local knowledge should approach this bay with the utmost caution. *Charts 680, plan of Ste. Luce anchorage; 760.*

**Directions.—Anchorage.**—A vessel approaching Baie de Sainte-Luce should steer for Morne Manoumbu (Mount Manunbu), which appears above the casuarina trees at the mouth of Rivière Manoumbouarive, or Manery (Iramafi or Mangahafa), about  $4\frac{1}{2}$  miles north-north-westward of Sainte-Luce, bearing  $270^\circ$ , keeping a look-out for Garland rock.

When the summit of Ile Babet, near which stands an isolated coconut tree, is in line with Ile Souillac, a vessel should alter course south-south-westward so as to pass about 3 cables westward of the former islet, taking care to avoid the shoals north-westward and westward of it; a vessel should steer towards the anchorage with the coconut tree bearing  $160^\circ$ .

Anchorage may be obtained westward of the northern group of islets described above in depths of from about 19 to 23 feet ( $5^m8$  to  $7^m0$ ).

Vessels, drawing less than 20 feet ( $6^m1$ ), can anchor westward of the summit of Ile Chartres, but should not proceed farther southward on account of an isolated rock, which lies about 3 cables north-north-westward of the summit of Ile Babet.

*Chart 760.*

**Coast.—Aspect.—Dangers.**—From Sainte-Luce to Pointe d'Itapérina, about 14 miles south-south-westward, the coast is foul for more than 2 miles offshore; breakers were seen, in 1935, about three-quarters of a mile south-eastward of Ile aux Chèvres.

Rivière Magnafaty flows into the sea about three-quarters of a mile southward of the town of Sainte-Luce; between the southern entrance point of this river and Pointe Itapera, about 8 miles south-south-westward, the coast forms Baie de Manaivou.

Montagne d'Ambouis (Ambarabe mountain), 1,991 feet ( $606^m9$ ) high, situated about  $7\frac{1}{2}$  miles westward of the northern entrance point of Baie de Manaivou, is conspicuous.

A reef, above water and sunken, over which the sea breaks, and the outer edge of which is about  $1\frac{3}{4}$  miles offshore, lies near the centre of Baie de Manaivou; there is shelter between it and the shore, but no survey of this bay has been made, and it is exposed to winds from seaward; Roche Choumare (Tsiomaro rock), is the name given to the largest rock on this reef.

Baie d'Itapérina lies between Pointe Itapera and Pointe d'Itapérina; the north-western part of this bay is encumbered with islets and rocks.

Pointe d'Itapérina (*Lat.  $24^\circ 58'$  S., Long.  $47^\circ 07'$  E.*) may be identified by several small reddish peaks, which are more pointed, but not so high, as those farther northward; Monts Evatra (Ivatra), 572 feet ( $174^m3$ ) high, are situated at the base of the peninsula of which Pointe d'Itapérina is the southern extremity.

Roche Itapérina, over which the sea always breaks, lies about 4 cables south-eastward of Pointe d'Itapérina. The French vessel *Limier*, in 1885, observed a breaker occasionally between this rock and the coast; on account of this the channel between the rock and Pointe

*Charts 760, 597, 748a.*

*Chart 760.*

d'Itapérina is unsafe, and in passing outside the rock it should be given a berth of a mile.

*Charts 680, plan of Itapère bay; 760.*

- 5 Anse d'Itapère, is a small inlet on the western side of the peninsula, of which Pointe d'Itapérina is the southern extremity; its entrance is obstructed by reefs.

*Chart 760.*

- Abnormal magnetic variation.**—Abnormal magnetic variation was reported, in 1938, northward and eastward of Pointe d'Itapérina, as much as 20 miles offshore.

- Caution.**—Besides the necessity of keeping northward of the point of destination anywhere on this coast owing to the south-south-west-going current, it is essential, when approaching the coast, to keep a constant good look-out from the masthead for sunken dangers, which can generally be seen from a distance from aloft by the colour of the water. The transparency of the sea is such that in ordinary conditions the bottom is clearly visible in depths of from  $5\frac{1}{2}$  to  $6\frac{1}{2}$  fathoms ( $10^m$ l to  $11^m$ 9).

- Light.**—A light is exhibited, at an elevation of 328 feet ( $100^m$ 0) from a white circular masonry tower, 23 feet ( $7^m$ 0) in height, situated on Pointe d'Itapérina. This lighthouse is in telephonic communication with Fort Dauphin.

- Anchorage.**—During north-easterly and easterly winds good shelter may be obtained in depths of from 12 to 13 fathoms ( $21^m$ 9 to  $23^m$ 8), fine sand, on the western side of the peninsula, of which Pointe d'Itapérina is the southern extremity, about 4 cables offshore, with the light-tower bearing  $085^\circ$  and the northern slope of the third peak northward of the lighthouse  $044^\circ$ .

- Anchorage can be obtained close inshore, in depths of from 56 to 59 feet ( $17^m$ 1 to  $18^m$ 0), with the light-tower bearing  $090^\circ$ ; at this anchorage a vessel is completely sheltered from the sea raised by north-easterly winds. It has, however, been found that with strong north-easterly breezes, a heavy south-easterly swell, about 10 feet ( $3^m$ 0) high, has set in to the anchorage.

- 35 *Charts 680, plan of Fort Dauphin anchorage; 760.*

**Fort Dauphin.**—Baie du Fort Dauphin is entered between Pointe d'Itapérina and Cap Antsirabé, about 6 miles west-south-westward; the western shore of this bay is fringed by a sandy beach, fronted by some rocks.

- 40 The shores of the bay are low, and there is a chain of lagoons, connected with each other, just within the coastline; the land rises rapidly behind the lagoons and, in Piton Saint-Louis (*Lat.*  $25^\circ 00'$  S., *Long.*  $46^\circ 59'$  E.), about  $2\frac{3}{4}$  miles north-westward of Cap Antsirabé, attains an elevation of 1,812 feet ( $552^m$ 3).

- 45 *Chart 680, plan of Fort Dauphin anchorage.*

The peninsula, of which Cap Antsirabé is the southern extremity, is 112 feet ( $34^m$ 1) high and rocky, terminating in cliffs on its eastern side; Anse Dauphine, on the northern side of this peninsula, is the southernmost anchorage on the eastern coast of Madagascar.

- 50 A fort, of which the outer parts are only ruins, stands on the north-eastern extremity of the peninsula; from a distance the fort has the appearance of several towers with embrasures.

There is a light-tower, with a beacon close north-north-westward of it, near the northern extremity of the peninsula.

*Charts 760, 597, 748a.*

*Charts 680, plan of Fort Dauphin anchorage.*

The European settlement, which is visible from seaward, extends from the fort south-westward to the shore of Fausse Baie des Galions. Southward of this settlement lies the native village.

A Calvary, consisting of a large cross on a masonry pedestal, which is conspicuous, stands on a hill near the coast about 6 cables westward of Fort Dauphin light-tower, and there is a conspicuous tower about 7 cables west-south-westward of the same light-tower.

A jetty, at which landing can be effected, projects from the coast fronting the Custom house, on the southern side of Anse Dauphine.

**Current.**—Off Fort Dauphin the current usually sets south-south-westward at a rate of 2 knots.

**Light.**—A light is exhibited, at an elevation of 115 feet (35<sup>m</sup>0), from a grey metal tower, painted in white vertical stripes, on a concrete base, 26 feet (7<sup>m</sup>9) in height, situated on the northern extremity of the peninsula.

**Beacons.**—Flacourt beacon, painted white, surmounted by a diamond-shape with a black vertical stripe, stands on the coast close north-north-westward of the light-tower, and a triangular pyramidal masonry beacon, painted white with a black vertical stripe, is erected about half a mile west-north-westward of the light-tower.

**Dangers.**—An obstruction, the existence of which is doubtful, was reported, in 1938, to lie about 7 cables north-eastward of Flacourt beacon.

A rocky shoal, with a depth of 28 feet (8<sup>m</sup>5) over it, lies about 5½ cables north-eastward, and a shoal, with a depth of 26 feet (7<sup>m</sup>9), the existence of which is doubtful, about 3½ cables north-eastward of Flacourt beacon; a 16-foot (4<sup>m</sup>9) patch lies about 2 cables west-north-westward of the same beacon.

*Charts 680, plan of Fort Dauphin anchorage; 760.*

**Directions.—Anchorage.**—A vessel approaching Fort Dauphin should identify the peninsula of which Pointe d'Itapérina is the southern extremity. Piton Saint-Louis (*see view facing page 321*) should be steered for, bearing 270°, until Pointe d'Itapérina light-tower bears 360°, which leads about 5 cables southward of Roche Itapérina; thence a vessel should shape course to pass about 4½ cables northward of Fort Dauphin light-tower (*Lat. 25° 01' S., Long. 47° 01' E.*), steering with the beacon, 5 cables west-north-westward of the light-tower, in line with the Calvary, 6 cables westward of the light-tower, bearing 249°, anchoring in depths of 6½ fathoms (11<sup>m</sup>9), sand, when Flacourt beacon is in line with the light-tower, bearing about 155°.

To obtain more shelter from the south-easterly swell, vessels, drawing less than 20 feet (6<sup>m</sup>1), may, in fine weather, anchor closer in with Flacourt beacon a little open north-eastward of the light-tower; vessels are advised not to proceed southward of the Calvary leading line.

This bay does not afford very good shelter especially during fresh winds from between north and east; with north-easterly squalls it is not prudent to remain at this anchorage, and vessels should seek shelter under Pointe d'Itapérina. Although with strong south-easterly winds the swell causes vessels to roll it is not sufficiently heavy to prevent communication with the shore, which is exceptional for the southern part of the eastern coast of Madagascar. This anchorage is at all times of the year precarious on account of the swell and because of squalls which may cause the cable to part.

*Charts 760, 597, 748a.*



*Charts 680, plan of Fort Dauphin anchorage; 760.*

A vessel approaching from southward must take care not to mistake Cap Ranavalona, a conspicuous wooded bluff, about 300 feet (91<sup>m</sup>4) high, situated 2½ miles south-westward of Cap Antsirabé, for the peninsula on which Fort Dauphin stands, as, in thick weather, a vessel might by mistake be run into Fausse Baie des Galions.

*Chart 680, plan of Fort Dauphin anchorage.*

**Jetty.**—The jetty, mentioned on page 325, is available for vessels drawing less than 13 feet (4<sup>m</sup>0); there is one one-ton and one 5-ton crane.

**Port limits.**—The limits of the port are approximately as follows:—

From a position on the high water line 090° distant about three-quarters of a cable from Flacourt beacon, a line drawn in an 090° direction for a distance of about 8 cables, thence in an 000° direction for 10½ cables and thence in a 270° direction to the high water line.

**Town.**—Fort Dauphin, the capital of the province, had a population, in 1936, of 10,283.

There is steamer communication with the other Madagascan ports. Fort Dauphin is connected with the general telegraph system.

There is a regular air service to Tananarive.

**Port facilities.**—Fresh provisions are obtainable.

A hospital, situated on a plateau south-eastward of the town, was, in 1945, under construction.

**Signal station.**—**Storm signals.**—There is a signal station with which vessels can communicate by day.

Signals indicating the locality threatened by a cyclone, *see* page 27, are displayed.

*Chart 760.*

**Coast.**—**Aspect.**—**Dangers.**—From Cap Antsirabé to Cap Andavaka, about 22 miles west-south-westward, the coast is rocky and broken.

The mountains of the interior are very high, with jagged summits, and slopes in which there are deep ravines. Mont Andrahomanana (*Lat. 25° 10' S., Long. 46° 39' E.*), about 1,400 feet (426<sup>m</sup>7) high, situated about 3 miles northward of Cap Andavaka, is isolated, surmounted by three hillocks of unequal elevation, and is a conspicuous landmark.

The transparency of the sea, near the coast, between Fort Dauphin and Cap Andavaka, is such that, under ordinary conditions, the bottom is clearly visible in depths of 6½ fathoms (11<sup>m</sup>9).

Fausse Baie de Galions is filled with coral rocks and shoals, over which the sea breaks.

Baie de Ranofotsy lies about 12 miles west-south-westward of Cap Ranavalona; the entrance channel is about a mile wide, but a small coral shoal, with depths of 5 feet (1<sup>m</sup>5) over it, lies in mid-channel, and may be passed on either hand, care being taken to avoid the rocks projecting a short distance from the points on either side. In the north-western part of the bay is a black rock, resembling the hull of a ship; eastward of this rock is a creek.

About 2 miles south-westward of Baie de Ranofotsy is a rocky islet lying close offshore; it is connected with the coast by a bank, which is awash; thence to Crique d'Andrahomanana, about 4 miles west-south-westward, the coast is fringed by rocks, mostly above water.

The shores of Crique d'Andrahomanana are fringed by rocks, mostly

*Charts 760, 597, 748a.*

*Chart 760.*

awash and steep-to; there is a sandy beach at the head of this cove.

Cap Andavaka is a promontory which is visible as soon as a vessel is clear of the peninsula on which Fort Dauphin stands; it makes as an island.

From Cap Andavaka to the mouth of Rivière Manambovo, about 52 miles west-south-westward, the high land decreases in elevation, and the coast is backed by a large wooded plain, which becomes more thickly wooded the farther westward a vessel is; the only eminences on this stretch of coast are some conspicuous large white sandhills.

Rivière Mandrare flows into the sea about 25 miles west-south-westward of Cap Andavaka; the entrance to this river is difficult to identify, but near it are some trees more bushy than the others.

From the mouth of the Mandrare the coast trends about 28 miles west-south-westward to the mouth of the Manambovo.

From the mouth of the Manambovo the coast, which is rocky and rises perpendicularly, trends about 37 miles west-south-westward to Cap Sainte-Marie.

Cap des Karimboly is situated about 17 miles south-westward of the mouth of the Manambovo, and is fringed by a reef which extends as much as  $1\frac{1}{2}$  miles offshore; about 2 miles eastward of the cape, the reef forms Port de Betanta, on the shores of which stands the village of Faux Cap.

On the western side of Cap des Karimboly is Anse de Karimboly, which should not be entered without local knowledge.

For a distance of about 16 miles westward of Port de Betanta a barrier reef, over which the sea does not break, extends parallel to the coast at a distance of about  $2\frac{1}{2}$  miles offshore.

Cap Sainte-Marie (Lat,  $25^{\circ} 39' S.$ , Long.  $45^{\circ} 06' E.$ ) is described on page 258.

**Caution.**—Between Fort Dauphin and Cap Sainte-Marie, in 1933, the survey of the coast was incomplete. The positions of the islands, dangers, and lines of soundings given on the chart are inaccurate, both in absolute position and in relation to the coast.

The coast from Cap des Karimboly to Cap Sainte-Marie was reported, in 1916, to lie from 2 to 3 miles southward of its charted position.

Owing to the dangers which have been reported between these capes, vessels should give this part of the coast a berth of at least 5 miles.

**Currents.**—See page 258.

**Off-lying dangers.**—A shoal, with a depth of 2 fathoms ( $3^m7$ ) over it, the position of which is doubtful, on which s.s. *Goth* struck, in 1909, is reported to lie about  $3\frac{1}{2}$  miles offshore  $16\frac{1}{2}$  miles eastward of Cap Sainte-Marie.

In 1898, the *Harlech Castle* found depths less than those charted, at an estimated distance of from 10 to 15 miles offshore in the vicinity, and eastward of Cap Sainte Marie; the soundings were taken at night, and the positions by dead reckoning, and are therefore scarcely reliable.

The shoal, with a depth of 2 fathoms ( $3^m7$ ), about 17 miles south-westward of Cap Sainte-Marie, is described on page 258.

**Anchorage.**—Baie de Ranofotsy affords anchorage to small vessels with local knowledge, on either side of the bay, in depths of from 23 to 36 feet ( $7^m0$  to  $11^m0$ ), mud, interspersed with patches of coral; vessels making a long stay may find it better to anchor off the western side as

*Charts 597, 748a.*

*Chart 760.*

depths of 23 feet (7<sup>m</sup>0) will be found closer inshore than on the eastern side, but the eastern side is better during strong easterly winds.

Strong south-easterly or south-westerly winds cause much swell and surf in the bay.

Crique d'Andrahomanana affords anchorage to small vessels with local knowledge in depths of from 10 to 29 feet (3<sup>m</sup>0 to 8<sup>m</sup>8); the entrance is difficult to identify.

To make this cove a vessel should approach from eastward, keeping close to the coast. A small vessel can enter, in fine weather, keeping in mid-channel, as the entrance points are foul. Speed must be reduced in good time, and the vessel swung on her anchor; she can then be manœuvred stern first to the inner part of the harbour (*Lat.* 25° 12' S., *Long.* 46° 40' E.) and secured with hawsers to the shore.

**Signal station.—Storm signals.—***See* page 258.

*Chart 748a.*

**DISCOLOURED WATER.**—In May, 1891, the Italian barque, *Oreb*, reported passing through two patches of highly discoloured water in lat. 26° 25' S., long. 52° 27' E., or about 300 miles from the nearest part of the south-eastern coast of Madagascar, where oceanic depths are supposed to exist. No soundings were taken, nor has any further report on the subject been received. Probably the cause of the discoloration was the presence of marine animalculæ, by which and similar appearances mariners have often been deceived.

*Charts 597, 748a, 2483.*

## CHAPTER XI

TROMELIN ISLAND—CARGADOS CARAJOS SHOALS—ILE DE LA RÉUNION—MAURITIUS—RODRIGUEZ ISLAND—ILE AMSTERDAM AND ILE SAINT-PAUL

*Charts 1881, plan of Tromelin island; 2899.*

**TROMELIN ISLAND.**—Tromelin island (*Lat. 15° 52' S., Long. 54° 25' E.*), a dependency of Mauritius, lies about 230 miles eastward of Cap Est, the eastern extremity of Madagascar; it consists of a mass of sand, the northern part of which was, in 1875, 15 feet (4<sup>m</sup>6) high and covered with bushes, and the southern part was very low. This island is bordered by a coral reef extending about three-quarters of a cable offshore, over which the sea breaks heavily. A small galvanised iron hut stood, in 1907, on the north-eastern side of the island. 5

Landing can only be effected on a steep sandy beach just eastward of the northern extremity, and even there should only be attempted near high water. 10

**Tide race.**—A heavy race is caused off the northern extremity of Tromelin island by the meeting of the ebb stream and the west-going current; this often breaks so heavily as to be dangerous for boats at a distance of 2 or 3 cables offshore. 15

*Chart 1881, plan of Tromelin island.*

**Banks.**—A bank, with depths of less than 10 fathoms (18<sup>m</sup>3) over it, extends about one mile west-north-westward, and a similar bank about half a mile eastward and south-eastward of the island. 20

**Anchorage.**—There is anchorage on the former bank, in depths of 8 fathoms (14<sup>m</sup>6), sand and coral, under the lee of the island, during the south-east monsoon, but the holding ground is indifferent.

*Charts 1881, 2899.*

**CARGADOS CARAJOS SHOALS.**—This extensive group of reefs, islets, and shoals is under the jurisdiction of Mauritius, and is known there as St. Brandon. It lies about 295 miles eastward of Tromelin island; it was reported, in 1941, to lie about 3 miles further south-westward than charted. 25

The eastern side of the group, in addition to the tremendous sea always breaking over it, is reported to be steep-to, and therefore most dangerous to approach under any circumstances. 30

*Chart 1881.*

The principal or great reef is above water, extending from the north-western extremity in a curve south-eastward, southward, and south-westward; thus the concave side is turned westward, and the northern extremity is about 26 miles from the southern extremity. The 35

*Charts 2899, 748a, 748b.*

M\*

*Chart 1881.*

bay on the western side of the reef is encumbered with rocks and shoals; the eastern side of the reef has not been closely examined in consequence of the impossibility of approaching its eastward face from 5 seaward. The outline was sketched in by Lieut. Mudge, R.N., in 1825, by means of boats penetrating amongst the reefs from the western side.

Several islets and rocks lie on the reef, and off its western side are many detached ones; all are low, and many are liable to be submerged 10 in heavy weather.

Ile Raphael, lying about  $1\frac{1}{2}$  miles southward of the northern extremity of the reef, is a group of three islets connected by low sandbanks; it is visible from a distance of about 10 miles. There were several buildings on Ile Raphael, in 1905, also several casuarina and coconut 15 trees; in 1932, there were only three inhabitants. A conspicuous clump of trees, the position of which is approximate, stands about 2 cables north-north-eastward of Ile Raphael (Lat.  $16^{\circ} 27' S.$ , Long.  $59^{\circ} 37' E.$ ). Landing can be effected at the south-eastern end of this group; a boat channel leads north-eastward through the reef surround- 20 ing Ile Raphael, between rocks, awash, lying about 100 yards ( $91^m4$ ) southward of the group.

Mapare and Avocare islets, situated, respectively, about 10 miles south-south-eastward, and  $9\frac{1}{2}$  miles southward of Ile Raphael, have trees growing on them, and are visible from a distance; the former can 25 only be reached by pirogues over the reef, the latter is approachable by small vessels with local knowledge, but it is reported, on account of coral heads and other dangers, to be very difficult of access. In 1931, Avocare islet was the headquarters of the fishing industry.

In 1939, there were several huts on the islet lying 2 miles north- 30 westward of Avocare islet.

Verronge, an islet lying about  $4\frac{3}{4}$  miles south-south-westward of Avocare islet, is surrounded by many shoal coral heads; this islet is used as a fishing station.

Between Verronge and Coco island, about 10 miles south-westward, 35 are many islets which are not shown on the chart.

A conspicuous clump of trees, about 70 feet ( $21^m3$ ) in height, consisting of a single palm standing in a gap between two groups of four palms, is situated about 10 miles south-south-westward of Avocare islet, on a long, low and otherwise bare island. When approaching from 40 southward this clump of trees is sighted shortly after sighting Coco island.

Coco island, near the southern end of the reef, had no trees on it in 1922, and therefore is not sighted by vessels approaching the northern part of the reef from eastward or westward until considerably 45 after one of the islets between it and Avocare islet.

The establishments in the Cargados Carajos group belong to a company in Mauritius and are visited periodically by a vessel from that island.

The exports consist of salt fish, guano, and tortoise shell.

50 **Note.**—Chart 1881 should be used with caution, as it was reported, in 1944, that the chart appeared to be inaccurate southward of lat.  $16^{\circ} 40' S.$

**Off-lying islands and dangers.**—The off-lying islets, described below, are from about 8 to 10 feet ( $2^m4$  to  $3^m0$ ) high; the larger ones

*Charts 2899, 748a, 748b.*

*Chart 1881.*

are covered with low shrubs and creepers, having the appearance of grass. They are visited in August for breeding purposes by enormous numbers of sea birds.

Albatross island, lying about 10 miles northward of the northern extremity of the reef, is about 10 feet (3<sup>m</sup>0) high, and covered with grass and scrub; two conspicuous palm trees, the only ones on the island, stood, in 1944, about half a mile from its northern extremity, and can be seen from a distance of about 12 miles. The *Samarang*, in 1846, was unable to effect a landing on Albatross island.

North island (*Lat.* 16° 23' S., *Long.* 59° 39' E.), lying about 8½ miles south-south-eastward of Albatross island, is surrounded by a reef; breakers have been seen about 2 miles north-eastward of it, and a shoal, with depths of 1½ fathoms (2<sup>m</sup>3) over it, lies about a mile southward of it.

A dangerous shoal, discovered, in 1806, by M. Roussin in the French frigate *Semittanté*, lies about 5 miles west-south-westward of North island.

Siren island lies about 2 miles south-westward of Ile Raphael.

About 4 miles south-westward of Siren island is Pearl breaker; a conspicuous reef extends about 6 cables south-south-eastward of Pearl breaker.

Pearl island, lying about 2½ miles south-westward of the charted position of Pearl breaker, is composed of conspicuous red rock and, with the exception of a conspicuous clump of trees on its north-eastern end, is completely bare of vegetation; there was, in 1944, a settlement, comprised of red-roofed tin sheds.

Frigate island lies 3 miles southward of Pearl island; in 1922, there were three conspicuous mounds of guano, covered with grass on it; in 1939, there were some bushes and low trees on the eastern end of the island. Landing can be effected on this island, which swarms with rats.

Baleine rocks lie about 4½ miles southward of Frigate island; the sea, in 1942, was not seen to break over these rocks and, on another occasion, in fine weather and a calm sea, their position could be seen by the discoloration of the water.

**Tidal streams.—Current.**—At the anchorage off Ile Raphael the tidal streams in both directions are felt somewhat strongly, but chiefly the north-going stream. Off Frigate island they are very slight, the south-going stream alone being distinguishable. At the anchorage off Coco island the tidal stream sets northward, at the rate of about half a knot, when the tide is rising; the south-going stream is barely perceptible.

In the month of August a strong current, setting westward, was experienced off the southern side of the group.

**Directions.**—Cargados Carajos islets should not be approached by night, but, during daylight, in clear weather, those with trees may be distinguished from a distance. A vessel approaching from southward should steer for the main reef, the south-western extremity of which may be rounded at a distance of one mile; a vessel approaching from northward is recommended to make Albatross island.

**Anchorage.**—Anchorage can be obtained about 3 cables westward of Ile Raphael, or at a similar distance east-north-eastward of Siren island.

Vessels can anchor in the bight north-eastward of Coco island, from

*Charts 2899, 748a, 748b.*

*Chart 1881.*

2 to 4 miles from that island, and about a mile from the reef, in depths of not less than 11 fathoms (20<sup>m</sup>1), sand.

*Chart 2899.*

- 5 **Nazareth bank.**—This extensive bank may be considered to extend from the bank (*Lat.* 16° 12' S., *Long.* 59° 38' E.) northward of Cargados Carajos shoals for about 200 miles north-north-eastward, terminating in about lat. 13° 20' S., long. 61° 10' E.; the width varies from 30 to nearly 100 miles. This bank is frequently crossed by vessels, and the  
10 least known depth of 14 fathoms (25<sup>m</sup>6) is situated near the eastern extremity in lat. 14° 30' S., long. 61° 28' E. At about 50 miles westward of this position is a depth of 15 fathoms (27<sup>m</sup>4); no depths greater than 20 fathoms (36<sup>m</sup>6) have been found between these two positions, and this extensive flat extends about the same distance northward.  
15 The limits of the bank are clearly indicated by the change in colour of the sea.

**Current.**—The deep channel between Nazareth bank and Saya de Malha bank (page 102) is about 100 miles wide, and a westerly current has been known to set through it at a rate of from 25 to 50 miles a day.

- 20 Between the shoalest part of Nazareth bank and Cargados Carajos shoals, the current also sets strongly westward throughout the year.

*Chart 1497.*

- ILE DE LA RÉUNION.—General remarks.—Aspect.**—Ile de la Réunion, a French possession and a dependency of Madagascar, lies  
25 about 380 miles eastward of the south-eastern coast of Madagascar. It was discovered by the Portuguese navigator, Dom Pedro Mascarenhas, about the year 1507; it was then uninhabited by either man or beast. The first colony was established, in 1664, under the French East India Company, at Baie de Saint-Paul; after a century in the  
30 hands of the company it reverted to the French Government, in 1764. It was taken by the English, in 1810, but restored to the French, in 1815, under the name of Ile Bourbon, which it retained until 1848, when it was renamed Réunion.

- It is of volcanic formation; many extinct craters are to be seen, but  
35 a volcano, 8,611 feet (2,624<sup>m</sup>6) high, situated in the south-eastern part of the island, is still active; it frequently emits ashes, but the last flow of lava was in 1860; slight shocks of earthquake are frequent. The island is very mountainous; near the centre Piton des Neiges rises to an elevation of 10,069 feet (3,069<sup>m</sup>0), and is generally tipped with  
40 snow for a short time in every winter season. About 3½ miles westward is Grand Bénard, 9,497 feet (2,894<sup>m</sup>7) high, and 2½ miles farther southward is Petit Bénard, 8,059 feet (2,456<sup>m</sup>4) high; between those three great peaks Petites Salazes present three needle points, 7,500 feet (2,228<sup>m</sup>6) high, and 4 or 5 miles northward is the gigantic cone, Pic  
45 Cimandef, 7,303 feet (2,226<sup>m</sup>0) high. Between Piton des Neiges and the volcano near the south-eastern end of the island, there extends a level plain called Plaine de Cafres or des Sables 5,250 feet (1,600<sup>m</sup>2) high; this line continued north-westward to Pointe des Galets (*Lat.* 20° 55' S., *Long.* 55° 17' E.) forms an imaginary division of the island  
50 into two parts; the north-eastern part is called the *windward side* and the south-western the *leeward side*, but without due reason, as the prevailing wind is south-easterly.

The summits of the higher mountains are covered with moss;

*Charts 2899, 748a, 748b, 2483.*

*Chart 1497.*

lower down will be found reeds and coarse grass until the elevation is reduced to 5,000 or 4,500 feet (1,524<sup>m</sup>0 or 1,371<sup>m</sup>6). All the lower parts of the island are cultivated ; a large space at the south-eastern end, where lava has poured into the sea, presents the appearance of black waves devoid of vegetation, except a few lichens and casuarina trees in the crevices. On some parts of the coast the sand and gravel thrown up by the sea form retaining banks, behind which are ponds, but in most places the coast rises abruptly from the sea, and is steep-to.

The island is singularly gifted in richness of soil, and, from its great altitude, in variety of climate. On the eastern coast it is hot and damp, and on the western coast it is hot and dry. There is a cool damp climate on the eastern hills, and it is cool and dry on the western hills.

The principal rivers are Rivière des Galets, Rivière Saint-Etienne, Rivière du Mât, and Rivière Sainte-Suzanne ; none of these is navigable except the last, which allows small vessels to ascend about half a mile ; they are all torrents during heavy rains, but are dried up or nearly so during the fine season. There are three hot mineral springs.

Sulphur has been found, also limestone and some minerals ; the latter are principally found near the centre of the island.

There is a Governor and a Conseil-Général, the latter elected by the inhabitants, and the colony returns one senator and two deputies to the Legislature in Paris.

There are no harbours in the colony, with the exception of the artificial harbours at Port des Galets and at Saint-Pierre, the former only being available for moderate sized vessels ; it is impossible to enter or leave Port des Galets in rough weather or when there is a heavy swell. All merchant vessels from abroad must call at Saint-Pierre, Saint-Paul, Port des Galets, or Saint-Denis (*Lat. 20° 52' S., Long. 55° 27' E.*), where permits are granted to visit the remainder of the coast ; and they must take their departure or clearance from one of those four places, where alone there are Customs' establishments.

At other places round the island Marine establishments have been formed by private enterprise with all necessary appliances for loading and unloading vessels, where goods are landed by specially built boats. Of these Marine establishments in open roadsteads, those on the northern side of the island are safest, as the prevailing wind blows onshore at the south-eastern side, where also the holding ground is decidedly bad. Early in December, vessels must take up offshore berths, and between November and April should put to sea on the first appearance of bad weather.

The regulations for entering the harbours of French possessions in time of war will be found on page 23.

The population of Réunion, in 1936, was 208,858.

The language in common use is a French *patois*.

**Currents.**—For ocean currents in the neighbourhood of Ile de la Réunion, see page 15.

The currents to be expected in the vicinity of this island in approaching it from northward are westerly and from southward south-westerly. Resulting from this general direction, it will be found that at the eastern end of the island, when near the land, the direction of the current is very uncertain, sometimes turning northward round the northern side and sometimes round the southern side, as it may be impelled by the general body of the current approaching from eastward ; at the western end,

*Charts 2899, 748a, 2483.*



*Chart 1497.*

again, there is a space with very variable currents between the two main streams. Here the stream sometimes sets northward and sometimes southward, following the line of the coast without any apparent  
 5 cause for change in direction or force, though at a few miles from the coast it is reported at times to attain a rate of 3 knots.

No tidal streams are perceptible anywhere round the coast.

**Rollers.**—These extraordinary phenomena, called by the inhabitants *Raz de Marées*, though at certain seasons and under certain  
 10 barometric conditions affording a sure indication of the vicinity of a cyclone, also occur at certain intervals, in fine weather and during a perfect calm, unaccompanied by any change in the atmosphere or other indication. The first appearance is a long swell, not assuming the shape of an ordinary wave until it reaches the shore, on which it bursts  
 15 with great violence, sometimes assuming greater proportions and grandeur than during a cyclone. Besides stopping all communications during periods varying usually from 12 to 24 hours, great injury is frequently inflicted on landing stages and other works at the water side.

**Quarantine.**—The authorities are very particular and quarantine  
 20 regulations are strictly enforced, principally through fear of bubonic plague, cholera, and small-pox. There is a lazaretto at Ravine Grande Chaloupe, about  $4\frac{1}{2}$  miles westward of Saint-Denis (*Lat.*  $20^{\circ} 52' S.$ , *Long.*  $55^{\circ} 28' E.$ ).

**Products.**—The principal product is sugar-cane; the other products  
 25 are perfumes, manioc, vanilla, green aloes, and coffee. All tropical, as well as European, fruits and vegetables may be grown.

**Trade.**—The chief imports are rice, grain, and cotton goods; the chief exports are sugar and spirits.

**Shipping.**—In 1937, 146 vessels entered the ports of the island.

30 **Currency.**—Local bank notes and token nickel coinage are in circulation.

**Pilotage.**—Where authorised pilots are stationed, pilotage is compulsory for merchant vessels.

35 **Communications.**—There is steamer communication with Mauritius, Madagascar, Iles Comores, the east coast of Africa, Aden, and Marseilles.

There are telegraph and telephone systems.

There is a radio station at Saint-Denis.

**Signal stations.**—**Cyclone signals.**—Signal stations are estab-  
 40 lished at Pointe des Galets, Saint-Paul, and Saint-Pierre. With all these, vessels can communicate by the International Code of Signals.

At these signal stations, and also at the look-out station flagstaff, Saint-Denis, the following signals are displayed, indicating the probable approach and general track of cyclones in the vicinity of the island.

45 These signals are to be taken as a general guide only, and are in no way intended to prevent but rather to assist mariners in using their own judgment as to the best way of avoiding storms:—

Cone point up. Cyclone expected.

50 Two cones both point up. Cyclone approaching from north-eastward.

Two cones points together. Cyclone appears likely to pass at a considerable distance northward of the island.

Two cones bases together. Cyclone appears likely to pass a short distance northward of the island.

*Charts 2899, 748a, 2483.*

**Chart 1497.**

- Cone point up above a ball. Cyclone appears likely to pass southward of the island, travelling from north-eastward to south-westward.
- Cone point down above a ball. Cyclone appears likely to pass southward of the island, travelling from north-westward to south-eastward.
- Two cones both point down. Cyclone appears likely to pass westward of the island, travelling from northward to southward. 10
- Cone point up below a ball. Cyclone appears likely to pass eastward of the island.
- Cone point down below a ball. Cyclone, which has already passed in a northerly direction, appears to have recurved, and is again approaching the island, travelling from north-westward to south-eastward. 15
- Cylinder. Barometer rising; all danger over.

**Local weather.**—See page 51.

**Meteorological tables.**—See page 60. 20

**Chart 1497, with plan of St. Denis.**

**Saint-Denis.**—The town of Saint-Denis (Lat. 20° 52' S., Long. 55° 27' E.), situated at Pointe des Jardins, the northern extremity of the island, is the capital and most important town. It is the residence of the Governor, and, in 1937, had a population of 30,800. 25

The town, surrounded by verdure, can be seen from a considerable distance; the high tower of the church is conspicuous, also the framework mast of the radio station situated near the landing place on the north-western side of the town.

Rivière Saint-Denis flows into the sea through a deep ravine close westward of Pointe des Jardins, and is traversed by a bridge near its mouth. 30

Westward of the town the land is high, and slopes steeply to the coast, terminating in Cap Bernard, about 1½ miles westward of Pointe des Jardins; eastward of the town the coast is low. 35

The anchorage off the town is exposed to winds from west-south-west, through north, to east-south-east, which occasionally cause a heavy swell.

Saint-Denis is connected by railway with all the coastal towns eastward as far as Saint-Benoît, and westward as far as Saint-Pierre. 40

Landing is effected at an iron landing stage, the deck of which is 20 feet (6<sup>m</sup>1) high, situated on the site of the old Pont du Roi. On account of the constant swell boats should lie at this jetty bows to seaward. The jetty is reported to be in a bad state of repair; landing can only be effected in fine weather on the beach. 45

Barachois, a small creek, close to the landing place, is completely filled with shingle.

**Port signals.**—A white flag with a square blue centre is displayed on the radio mast, when communication with the shore is forbidden.

**Lights.**—Two lights, disposed vertically, are exhibited, at elevations of 131 and 102 feet (39<sup>m</sup>9 and 31<sup>m</sup>1), from the radio mast.

A light is exhibited from the head of the landing jetty.

**Directions.**—The approach to this anchorage offers no difficulties. In clear weather Piton des Neiges is visible from a considerable dis-

*Charts 2899, 748a, 2483.*

*Chart 1497, with plan of St. Denis.*

tance, but more often than not the mountains are obscured, and the extremities of the island are the first land sighted.

At night approaching from northward, the light on Pointe de Bel-air, about  $8\frac{1}{2}$  miles eastward of Pointe des Jardins, should be sighted; a vessel can then, by aid of this light and the two vertical lights at Saint-Denis, steer for the anchorage. A good look-out must be kept when approaching this anchorage, as vessels anchored there do not show up against the land, and their lights are difficult to distinguish from those of the town.

If coming from westward or north-westward a vessel, at night, should make the light on Pointe des Galets, the north-western extremity of the island.

**Abnormal magnetic variation.**—Abnormal magnetic variation was experienced at the anchorage off Saint-Denis by *La Gloire*, in 1938.

**Anchorage.**—There is anchorage north-westward of the town (Lat.  $20^{\circ} 52' S.$ , Long.  $55^{\circ} 27' E.$ ), in depths of from 10 to 17 fathoms ( $18^m3$  to  $31^m1$ ), during the bad season, from November to April, but vessels must be ready to weigh on the first signs of bad weather.

During the fine season vessels can anchor closer inshore. During this season, in August, 1880, H.M.S. *Euryalus* anchored in depths of 13 fathoms ( $23^m8$ ), black sand and broken shells, good holding ground, about 4 cables offshore, with the centre of the church, bearing about  $174^{\circ}$ . A swell is experienced here. Less swell will be felt if a vessel anchors a little further south-westward, westward of Pointe des Jardins, in depths of 7 fathoms ( $12^m8$ ), good holding ground.

Vessels arriving in the road should keep well offshore, as the current sets on to Pointe des Jardins, and lie head to seaward.

**Radio D.F. station.**—There is a radio D.F. station at the radio station at Saint-Denis.

*Chart 1497.*

**North-western side.—Coast.—Aspect.**—The high slopes between Saint-Denis and Pointe du Gouffre, about 3 miles westward, with numerous cascades, some of which fall perpendicularly to the sea from an elevation of more than 300 feet ( $91^m4$ ), are imposing.

The coast between Pointe du Gouffre and Cap de la Possession, about  $3\frac{1}{2}$  miles south-westward, is mountainous and intersected by ravines; the mountains slope steeply to the coast, which is inaccessible except at the entrance to Ravine Grande Chaloupe. Pointe de la Ravine à Malheur, about three-quarters of a mile north-eastward of Cap de la Possession, is a conspicuous headland. The small town of La Possession is situated on the coast close westward of Cap de la Possession.

From Cap de la Possession the coast, which is low, trends about  $3\frac{1}{2}$  miles westward to Pointe des Galets.

See view on chart.

Pointe des Galets, which is very low, is only conspicuous from north-eastward or south-westward; from north-westward it is difficult to identify, except for the light-tower standing on the point. When Pic Cimandef is seen in line with Ravine des Galets, bearing  $117^{\circ}$ , see view on chart, a vessel is south-westward of the point.

**Light.**—A light is exhibited, at an elevation of 92 feet ( $28^m0$ ), from a grey tower, 66 feet ( $20^m1$ ) in height, situated on Pointe des Galets.

*Charts 2899, 748a, 2433.*

*Chart 1497.*

**Anchorage.**—There is temporary anchorage off La Possession, in depths of 11 fathoms (20<sup>m</sup>1), black sand, about 4 cables offshore, with the flagstaff in the village bearing 150°, Pointe de la Ravine à Malheur 066°, and Pointe des Galets 266°. 5

*Chart 1497, plan of Port des Galets.*

**Port des Galets.**—Port des Galets (Lat. 20° 55' S., Long. 55° 18' E.) is an artificial harbour situated about three-quarters of a mile southward of Pointe des Galets, where the coast is steep-to.

The entrance channel, with a least width of about a quarter of a 10 cable, leads between two jetties to the outer harbour, which is connected on its northern side by a passage, 78 feet (258) wide, leading into a rectangular basin; on the eastern side of this basin are two wet docks separated by a wharf.

In 1945, vessels of about 390 feet (118<sup>m</sup>9) in length and drawing up 15 to 19 feet (5<sup>m</sup>8) could enter the port.

**Current.**—As previously stated, *see* pages 333-334, the current at the western end of the island and off Pointe des Galets usually follows the direction of the coast one way or the other, and at 2 miles or more offshore sometimes attains a rate of 3 knots; but on nearing the 20 entrance to Port des Galets it has never been known to attain a rate of one knot. A series of observations made during several consecutive months of 1888 showed, that although the current always sets directly across the mouth of the port, either northward or southward, and most frequently the former, it never exceeds a rate of three-quarters of a 25 knot; to counteract its effect on a vessel entering, she should maintain a speed of 3 knots until beyond its influence.

**Rollers.**—At times rollers occur, which interrupt all communication with the shore. They last 24 hours, but rarely longer, and may be caused by cyclones passing a great distance from the island. *See also* 30 page 334.

**Pilotage.**—A pilot can be obtained by making the usual signals; he boards vessels about 5 cables outside the jetty heads. A pilot is indispensable on account of the currents at the entrance.

**Lights.**—A light on Pointe des Galets is described on page 336. 35

A light is exhibited, at an elevation of 121 feet (36<sup>m</sup>9), from the signal mast on the eastern side of Port des Galets.

**Beacons.**—The limit on each side of the entrance channel is marked by a pair of beacons situated on the eastern side of the outer harbour; they are made of sheet iron, each being surmounted by a St. Andrew's 40 cross, and painted white. Each pair of beacons indicates a line parallel with the other between which is the channel. To distinguish these beacons from the moveable beacons used for dredging purposes, their alignment has been marked by white patches on the eastern bank of the outer harbour. 45

The axis of the entrance channel is indicated by a pair of beacons standing at the head of the harbour; the front beacon, 30 feet (9<sup>m</sup>1) in height, situated near the sea-wall, is surmounted by a white disc, and the rear beacon, 39 feet (11<sup>m</sup>9) in height, standing on the level of the first row of houses, is surmounted by a white circular panel. 50

Two pairs of beacons, the northern pair standing on a sandhill on the northern side of the basin, and the southern pair on the southern side of the outer harbour, are leading marks for vessels entering or leaving the basin. The southern pair consists of white poles with

*Charts 1497, 2899, 748a, 2483.*

*Chart 1497, plan of Port des Gallets.*

white topmarks. The front beacon of the northern pair (*Lat.* 20° 55' S., *Long.* 55° 18' E.) consists of a white post, with a white cross-bar; the rear beacon also has a cross-bar, painted white.

- 5 **Port signals.**—The following signals are displayed from the signal mast at the Port office:—

Flag S of the International Code of Signals displayed at the masthead indicates that entry to the port is impracticable owing to rollers.

- Flag B displayed at the masthead indicates that the channel is  
10 engaged.

Flag P displayed at the masthead indicates that the channel is open.

Flag P displayed at the northern yardarm indicates that a vessel is leaving the harbour.

- Anchorage.**—There is no roadstead off the entrance to this harbour,  
15 there being depths of 55 fathoms (100<sup>m</sup>6) about 2½ cables offshore. There is, however, a patch, with depths of 25 fathoms (45<sup>m</sup>7), fine black sand, over it, situated about 6 cables, 241°, from the signal mast, and 1½ cables offshore, where vessels may find temporary anchorage during the day, with the northernmost beacon on the northern side  
20 of the basin just open north-westward of the extremity of the northern jetty, and bearing 045°, and the chimney of the Sainte-Thérèse works, about half-way up the mountains in line with the gate of an agricultural establishment close to the coast outside the village, bearing 107°. Care must be taken not to mistake the cemetery for the agri-  
25 cultural establishment. Within a radius of half a cable from this anchorage there are depths of 33 fathoms (60<sup>m</sup>4).

Vessels unable to remain at the outer anchorage on account of the weather are advised to proceed to Saint-Paul.

- Directions.**—Dawn is the best time for entering the harbour, as  
30 there is seldom any wind at that period. If entering at the time of year when the sun rises in the neighbourhood of the axis of the entrance channel it is necessary to enter before the sun is above the hills, as otherwise the glare makes it difficult to identify the leading beacons; these beacons are visible from a considerable distance.  
35 The pilots will give advice as to the current. A vessel should steer parallel with the axis of the channel, at a speed of 3 or 4 knots. If the current is setting southward she should bring her port side in line with the northern alignment of beacons, and if setting northward she should bring her starboard side in line with the southern alignment of  
40 beacons. This alignment should be taken up some distance outside the jetty heads to avoid having to use large angles of helm when entering between the jetties. When between the jetty heads the engines should be stopped. With a long vessel and a strong current, the stern may be swept to leeward while the bow is in still water;  
45 this must be anticipated by using the helm quickly and freely to keep the stern up to windward in order to preserve the direction of the channel, and to avoid being set on to the lee jetty head.

There are two warping buoys in the outer harbour (*Lat.* 20° 55' S., *Long.* 55° 18' E.).

- 50 **Basin.**—Vessels can secure to mooring posts in the inner basin; chain moorings, for use during cyclones, are available at most of the berths.

On the western side of the basin, which is not faced with masonry, is the coal depôt of the Messageries Maritimes. At the northern end

*Chart 1497, plan of Port des Gallets.*

is a pile wharf at which vessels load and discharge ; though secured to the jetty they usually have their starboard anchor as an off-fast.

Landing can be effected without difficulty by boats in this basin ; a good landing place is on the eastern side of the southern wet dock. 5

**Communications.**—Port des Galets is connected with the railway system of the island.

There is steamer communication with Mauritius, Madagascar, Africa, and Europe.

Port des Galets is connected with the telegraph and telephone systems 10 of the island.

**Port facilities.**—Some fresh provisions are available. Water is laid on at a few of the berths, and a water-boat is available.

There is a small stock of coal in the port ; it is better to order it in advance. 15

The harbour is equipped for handling cargo. There is one travelling and one fixed crane, each capable of lifting 7 tons, and there are several smaller cranes.

Tugs and lighters are available.

All kinds of repairs can be undertaken. 20

Pratique is given by the head Health Officer. Sick persons are sent to the lazaretto of Ravine Grande Chaloupe. Persons requiring hospital treatment should be sent by railway to Saint-Denis.

There are two small patent slips ; for the dimensions of the larger, see Appendix I, page 373. 25

**Signal station.**—**Storm signals.**—There is a signal station with which vessels can communicate by means of the International Code of Signals.

Cyclone signals, see page 334, are displayed.

*Chart 1497, with plan of Baie de Saint-Paul.* 30

**Baie de Saint-Paul.**—Baie de Saint-Paul, which is entered between Pointe des Galets and Pointe La Houssaye, the northern extremity of Cap de la Houssaye, about  $6\frac{1}{2}$  miles south-south-westward, is the only good roadstead off the island. During the fine season, from the middle of April to the middle of November, the wind is usually south-westerly, 35 caused by an eddy round the island ; during the bad season the wind is usually north-easterly. Baie de Saint-Paul is usually sheltered when the rollers are setting in at Saint-Denis, and vice versa. The shore of Baie de Saint-Paul is low and, generally, arid ; the beach, for the most part, consists of a mixture of large grey and black pebbles. 40

There is a conspicuous railway bridge about  $2\frac{1}{2}$  miles southward of Pointe des Galets (*Lat.*  $20^{\circ} 55' S.$ , *Long.*  $55^{\circ} 17' E.$ ).

Cap de la Houssaye is high and steep.

Landing is very difficult since the old wharf was destroyed. The foundation piles which remain at the extremity of the ruined wharf 45 are dangerous for boats. A ladder is situated on the northern side, but with the least breeze a dangerous bar is formed.

The town of Saint-Paul, which is situated about 2 miles eastward of Pointe La Houssaye, had a population, in 1937, of about 21,500.

**Jetties.**—A pier extends from the shore fronting the town. 50

A mole, with depths of from 30 to 49 feet ( $9^m1$  to  $14^m9$ ) alongside, extending about  $5\frac{1}{2}$  cables east-north-eastward from the coast about  $1\frac{1}{2}$  cables eastward of Pointe La Houssaye, was under construction, in 1941 ; a bank, with depths of less than 3 fathoms ( $5^m5$ ) over it, extends

*Chart 1497, with plan of Baie de Saint-Paul.*

northward from the shore to within about  $1\frac{1}{4}$  cables of the outer part of the mole.

**Lights.**—The light on Pointe des Galets is described on page 336.

- 5 A light is exhibited, at an elevation of 69 feet (21<sup>m</sup>0), from the signal mast at Saint-Paul.

**Anchorage.**—There is good anchorage, during the fine season, in depths of 11 fathoms (20<sup>m</sup>1), black sand, with the signal mast bearing 120°, and Pointe La Houssaye 240°.

- 10 During the winter there is anchorage in depths of 26 fathoms (36<sup>m</sup>6), good holding ground, with the signal mast bearing 160°.

Vessels mooring in this anchorage should lie with open hawse south-westward.

- Signal station.**—**Storm signals.**—There is a signal station with 15 which vessels can communicate by means of the International Code of Signals.

Cyclone signals, *see* page 334, are displayed.

*Chart 1497.*

- Western side.**—**Coast.**—**Aspect.**—**Dangers.**—Cap des Aigrettes, 20 a promontory, of which Pointe des Aigrettes, its western extremity, is situated about  $1\frac{1}{4}$  miles south-south-westward of Pointe La Houssaye, is hilly, and is easily identified either from northward or southward. *See* view on chart.

- The village of Saint-Gilles is situated about one mile southward of 25 Pointe des Aigrettes. A gap in the coastal reef here, into which a stream flows, forms a boat cove; there is easy landing, during fine weather, on the beach at the mouth of this stream.

- From Saint-Gilles the coast, which is high and intersected by numerous ravines, trends about 23 miles south-eastward to Saint-Pierre, and 30 is fringed in places by the coastal reef; vessels passing along this coast should keep at least half a mile offshore.

- Saint-Leu is a village situated about  $7\frac{1}{2}$  miles south-south-eastward of Saint-Gilles; a flagstaff stands on the coast near the northern end of the village. There are two landing places on the northern side of 35 Saint-Leu.

Pointe de Bretagne and Pointe du Portail (*see* view on chart) are headlands situated about  $2\frac{1}{2}$  miles south-south-westward and  $3\frac{1}{2}$  miles southward, respectively, of Saint-Leu (*Lat.* 21° 09' S., *Long.* 55° 18' E.).

- Pointe de la Petite Anse, close northward of which is a salt-water 40 lagoon, is situated about  $3\frac{1}{2}$  miles south-eastward of Pointe du Portail; the village of Étang Salé stands on the neck of land which separates the lagoon from the sea, and Ravine des Avirons is situated about one mile north-westward of this village.

- Landing at Étang Salé is dangerous as the sea takes a boat broadside 45 on when in the channel to the landing place, which is situated inside the northern extremity of the reef and south-westward of the village. Unless the sea is very calm, boats should only be sent in in case of necessity.

- When communication with the shore at Étang Salé is impossible a 50 white flag with a square blue centre is displayed at the Port office flagstaff.

Pointe de l'Étang Salé, about three-quarters of a mile south-eastward of Pointe de la Petite Anse, rises about half a mile inland to an elevation of 214 feet (65<sup>m</sup>2).

*Charts 2899, 748a, 2483.*

*Chart 1497.*

The town of Saint-Louis, situated about  $2\frac{1}{2}$  miles eastward of Pointe de l'Étang Salé, had a population, in 1936, of 19,195.

*Chart 1497, plan of St. Gilles.*

**Anchorage.**—There is anchorage off Saint-Gilles, in depths of from 20 to 21 fathoms ( $36^m6$  to  $38^m4$ ), with the church on the southern side of the stream bearing  $090^\circ$ , and Pointe des Aigrettes about  $010^\circ$ . Vessels should only use this anchorage in calm weather, with offshore breezes.

*Chart 1497.*

There is anchorage at Saint-Leu, in depths of at least 23 fathoms ( $42^m1$ ), sand and coral, westward of the Port office flagstaff. As the holding ground is not good, vessels should put to sea on the appearance of westerly winds or rollers.

There is anchorage, in depths of 19 fathoms ( $34^m7$ ), coral, about half a mile south-south-westward of Ravine des Avirons. When a sea breeze gets up, with the likelihood of rollers, vessels should weigh.

*Chart 1497, plan of St. Pierre.*

**Saint-Pierre.—Anchorage.—Depths.**—The town of Saint-Pierre stands at the foot of the mountains on the western bank of Rivière d'Abord; it can be identified from a considerable distance by its white buildings.

In 1937, the town of Saint-Pierre had 17,900 inhabitants.

The port is composed of an outer harbour formed by the old estuary of Rivière d'Abord, and an artificial basin excavated in the reef which extends from the western entrance point of the river.

There are depths of 10 feet ( $3^m0$ ) in the entrance to the outer harbour, with a least navigable width of 33 feet ( $10^m1$ ); the basin is only available for boats.

The port (*Lat.  $21^\circ 20' S.$ , Long.  $55^\circ 29' E.$* ), which, in 1934, was not available for shipping, can, when rendered practicable, be used only by small vessels with local knowledge.

It is inadvisable to attempt to enter while rollers are setting on the coast, on account of the bad holding ground, the want of swinging room, the swell which is caused by winds from between south-south-east and south-west, and the bar which then forms at the entrance to the estuary. This phenomenon is frequent in July and August.

There is anchorage at all times of the year off the mouth of Rivière d'Abord, with the church, which is situated on the western bank of the river about 4 cables from its entrance, bearing about  $018^\circ$ , in depths of from 19 to 23 fathoms ( $34^m7$  to  $42^m1$ ). During the cool season, viz.: from May to September, there is sometimes a heavy swell which, owing to the hardness of the holding ground, may cause the cables to part. It is essential, at all times of the year, to be ready to weigh, especially if there are signs of south-westerly winds.

**Light.**—A light is exhibited, at an elevation of 72 feet ( $21^m9$ ) from a mast, situated at the Harbour office.

**Pilotage.**—Vessels without local knowledge should employ one of the fishermen at the village of Terre-Sainte, situated on the eastern side of the entrance to Rivière d'Abord, who are officially appointed to act as pilots.

**Wharf.**—A wharf fronts the old workshops in the harbour. Vessels drawing 12 feet ( $3^m7$ ) can go alongside in order to work cargo. In order not to endanger the structure, vessels should, on account of the



*Chart 1497, plan of St. Pierre.*

surge which is often experienced in the harbour, drop the anchor in the middle of the harbour as they enter, and lay out hawsers astern.

There is a landing place in front of the old harbour workshops.

- 5 **Port facilities.**—Fresh provisions and water are obtainable. Moderate repairs can be undertaken.

**Signal station.**—**Storm signals.**—There is a signal station with which vessels can communicate by means of the International Code of Signals.

- 10 Cyclone signals, *see* page 334, are displayed.

*Chart 1497.*

- Southern side.**—**Coast.**—**Aspect.**—From Saint-Pierre the coast, which is high and steep-to, trends about 17 miles eastward to Pointe des Sables-Blancs and thence  $2\frac{3}{4}$  miles north-eastward to Pointe de la Table, the south-eastern extremity of the island; it is intersected by numerous ravines, through which flow torrential streams. The country is fertile, and numerous villages can be seen on the coast, the most important of which is Saint-Joseph, about 7 miles east-south-eastward of Saint-Pierre. The small town of Saint-Philippe stands on the hilly ground backing Pointe des Sables-Blancs.

There is no anchorage along this stretch of coast.

- Northern side.**—**Coast.**—**Aspect.**—**Dangers.**—From Pointe des Jardins the coast, which is low, trends about 6 miles eastward to Pointe Sainte-Marie (*Lat.*  $20^{\circ} 53' S.$ , *Long.*  $55^{\circ} 34' E.$ ).  
25 *Rivière Le Butor* flows into the sea about one mile south-eastward of Pointe des Jardins; there are numerous houses in this vicinity, surrounded by trees and cultivation.

The town of Sainte-Marie is situated on the coast about half a mile south-westward of Pointe Sainte-Marie.

- 30 *Roche de Cousin*, with a depth of 6 feet ( $1^m8$ ) over it, lies about three-quarters of a mile eastward of Pointe Sainte-Marie and  $1\frac{1}{2}$  cables offshore; *Cap Bernard*, bearing about  $274^{\circ}$  and seen over the land northward of the church at Saint-Denis, leads northward of this rock. *See view on chart.*

- 35 Pointe de Bel-air is situated about  $2\frac{3}{4}$  miles east-south-eastward of Pointe Sainte-Marie, and Pointe des Haziers about three-quarters of a mile west-north-westward of Pointe de Bel-air; the village of Sainte-Suzanne is situated about half a mile south-eastward of Pointe de Bel-air.

- 40 *La Marianne*, an above-water rock, lies about three-quarters of a cable northward of Pointe de Bel-air.

*See view on chart.*

From Pointe de Bel-air the coast, which continues low, trends about 4 miles east-south-eastward to Pointe de l'Etang.

- 45 **Light.**—A light is exhibited, at an elevation of 151 feet ( $46^m0$ ), from a white tower with a red horizontal band, 66 feet ( $20^m1$ ) in height, situated about 2 cables south-eastward of Pointe de Bel-air. *See view on chart.*

- Anchorage.**—The anchorage off Sainte-Marie is exposed to winds from west-north-west, through north, to east-south-east. Landing is effected in native boats. The anchorage is northward of the town, in depths of 7 fathoms ( $12^m8$ ), black sand.

There is anchorage off Sainte-Suzanne, north-north-eastward of the landing place which is situated about three-quarters of a mile eastward

*Charts 1497, 2899, 748a, 2483.*

*Chart 1497.*

of the village, during the winter in depths of 13 fathoms (23<sup>m</sup>8), blackish sand, and during the fine season in depths of 8 fathoms (14<sup>m</sup>6).

*Chart 1497, with plan of St. Benoît.*

**Eastern side.—Coast.—Aspect.—Dangers.**—Rivière du Mât 5 flows into the sea about 4 miles south-south-eastward of Pointe de l'Étang, and about 2½ miles southward of the mouth of this river is situated Pointe du Bourbier, with a landing place close southward of it.

The town of Sainte-Benoît stands on the south-eastern bank of Rivière des Marsouins, about one mile south-eastward of Pointe du 10 Bourbier.

*Chart 1497, with plan of St. Rose.*

From the mouth of Rivière des Marsouins the coast, which is indented by the mouths of several streams, trends about 6 miles south-south-eastward to Pointe du Quai la Rose, where some above-water rocks lie 15 within about one cable westward of it; the village of Sainte-Rose is situated on this promontory.

Port Caron is situated about 2½ cables west-south-westward of Pointe du Quai la Rose (*Lat.* 21° 06' S., *Long.* 55° 48' E.).

*Chart 1497.*

From Pointe du Quai la Rose the coast, which is rugged and mostly steep-to, trends about 2¾ miles east-south-eastward to Pointe du Piton 20 and thence 2¾ miles south-south-eastward to Pointe du Bambou; Piton Rond, about three-quarters of a mile southward of Pointe du Piton, attains an elevation of 409 feet (124<sup>m</sup>7). See view on chart. 25

A sunken rock lies about 1½ cables south-south-eastward of Pointe du Bambou, but otherwise this part of the coast appears to be free from dangers.

Anse des Cascades (*see* view on chart) is situated on the southern side of Pointe du Bambou. 30

From Pointe du Bambou the coast, which is rugged, trends about 9 miles southward to Pointe de la Table. The area within this part of the coast, known as Grand Pays Brûlé, is mostly of lava formation, and is intersected with deep crevasses. The coast is apparently free from dangers, but it is advisable to give it a wide berth. 35

*Chart 1497, plan of St. Benoît.*

**Anchorage.**—There is anchorage in depths of 12 fathoms (21<sup>m</sup>9) in the fine season and in depths of 16 fathoms (29<sup>m</sup>3) in the bad season, with the storehouses on Pointe du Bourbier bearing 261°, and the church at Saint-Benoît bearing 182° in the former case and 194° in the 40 latter. This anchorage has bad holding ground, and communication with the shore is always difficult.

*Chart 1497, plan of St. Rose.*

There is anchorage off Sainte-Rose about 2 cables eastward of Pointe de Bonne-Espérance, a promontory 6 cables westward of Pointe du 45 Quai la Rose, on a bank, with depths of from 12 to 29 fathoms (21<sup>m</sup>9 to 53<sup>m</sup>0), black sand, with the sheers on the landing place in line with the middle of the storehouse at Varangue, Port Caron, bearing about 142°. Vessels must moor as the anchorage ground is restricted.

*Charts 711, 2899.*

**MAURITIUS.—General remarks.**—*See* pages 6-9.

Mauritius is of volcanic formation and of considerable elevation; it lies about 92 miles east-north-eastward of Ile de la Réunion. Its

*Charts 1497, 2899, 748a, 2483.*

*Charts 711, 2899.*

coasts rise somewhat steeply from the sea, and depths of 100 fathoms (182<sup>m</sup>9), and upwards, are found at a distance of from one to 1½ miles offshore in most parts, but a bank, on which lie several islets and shoals, extends about 16 miles north-eastward of the northern end of the island.

*Chart 711.*

Mauritius is fringed by coral reefs. There are many streams, generally flowing through deep ravines, but none is navigable beyond a short distance from the sea; in the dry season, they are little more than brooks, but become raging torrents during heavy rains. The principal stream, Grand river, flows into the sea westward of Port Louis (Lat. 20° 09' S., Long. 57° 29' E.), about 14 miles south-westward of the northern extremity of the island. A deep lake, Grande Bassin, near the southern end of the island, about 6½ miles north-north-westward of its southern extremity, is an extinct crater, and there are other lakes of a similar description. Though there are several ports and anchorages of minor importance, the two principal harbours are Port Louis, on the north-western side, and Grand Port, on the south-eastern side; they are directly connected by railway.

There are three general hospitals, which are fully equipped. There are also district hospitals where medical cases are admitted.

**Local weather.**—See pages 51-52.

**Meteorological tables.**—See page 61.

**Aspect.**—The western and central parts of Mauritius are mountainous, attaining an elevation of 2,711 feet (826<sup>m</sup>3) in Piton Rivière Noire, the highest summit, about 6¼ miles east-north-eastward of Cape Brabant, the south-western extremity of the island; this peak is pointed, and appears dark in clear weather.

Pieter Both is a remarkable mountain, 2,676 feet (815<sup>m</sup>6) high, having a huge knob on the summit; it is situated about 3 miles south-eastward of Port Louis citadel. Piton du Milieu, near the centre of the island, about 6 miles south-south-eastward of Pieter Both, is a steep-sided cone, 1,932 feet (588<sup>m</sup>9) high.

Corps de Garde, 2,359 feet (719<sup>m</sup>0) high, situated about 7 miles south-westward of Pieter Both, presents a straight perpendicular shoulder, and Mount Rempart, 2,532 feet (771<sup>m</sup>7) high, about 3 miles south-westward of Corps de Garde, shows three needle-pointed peaks.

The mountains described above are good landmarks, the upper parts being generally bare basaltic columns, but the summits are frequently enveloped in cloud or mist; amongst them are many extinct craters and caves of great extent.

*Chart 2899.*

**Outlying bank.**—Depths of 34, 36, and 37 fathoms (62<sup>m</sup>2, 65<sup>m</sup>8, and 67<sup>m</sup>7), coral and rock, were obtained, in 1906, by the British s.s. *Soudan*, about 100 miles north-eastward of Mauritius; the depth of 36 fathoms (65<sup>m</sup>8) was situated approximately in lat. 18° 30½' S. long. 58° 43½' E. In 1934, H.M.S. *Hawkins* obtained a depth of 26 fathoms (47<sup>m</sup>5) in approximately lat. 18° 34' S., long. 58° 49' E.

*Chart 711.*

**Off-lying islets and dangers.**—**Tidal streams.**—**Light.**—Mauritius is free from off-lying dangers except at its northern end, where a bank extends about 16 miles north-eastward, there are general depths of from 20 to 35 fathoms (36<sup>m</sup>6 to 64<sup>m</sup>0) over this bank, increasing rapidly

*Charts 2899, 748a, 2483.*

*Chart 711.*

towards its edges, which are steep-to. A number of islets, *see* view on chart, and shoals lie on this bank; vessels striking soundings on its edge in thick weather will be in no danger provided they do not get into depths of less than 50 fathoms (15<sup>m</sup>2).

5

Serpent islet (*Lat.* 19° 49' S., *Long.* 57° 48' E.), which has light-coloured cliffs, is the north-easternmost of the group; it is 530 feet (161<sup>m</sup>5) high, and its north-western and south-eastern sides are foul. It lies 4 cables within the northern extremity of the bank.

Nab reef, lying about three-quarters of a mile westward of Serpent 10 islet, has depths of less than 6 feet (1<sup>m</sup>8), over which the sea breaks.

Round islet, 1,055 feet (321<sup>m</sup>6) high, is the highest of the group; it is of barren aspect, although there are a few palm trees on it. It lies about 1½ miles south-south-westward of Serpent islet and is inaccessible, except at two places on the western side, where landing may sometimes 15 be effected. It has the shape of a haycock; in cloudy weather, or when the horizon is hazy, it is often made out before the main island.

In the channel between Serpent and Round islets, which has a rocky bottom, the tidal streams attain a rate of from 3 to 4 knots.

The Blinder is a sunken reef over which the sea breaks occasionally; 20 it lies about a quarter of a mile westward of the north-western extremity of Round islet.

Both the east-going and west-going tidal streams set with great strength over The Blinder and Nab reef.

La Caille bank is a coral bank of small extent with a least known 25 depth of 7 fathoms (12<sup>m</sup>8) over it; it lies about 2½ miles southward of Round islet. The sea breaks over it occasionally, in heavy weather.

Abbé bank, a small submerged coral atoll, lying about 3½ miles south-south-westward of Round islet, is a narrow circular coral ridge, with depths of from 7 to 10 fathoms (12<sup>m</sup>8 to 18<sup>m</sup>3) over it, and of 30 from 11 to 18 or 19 fathoms (20<sup>m</sup>1 to 32<sup>m</sup>9 or 34<sup>m</sup>7) in the centre. The sea sometimes breaks over this bank in bad weather and occasionally during fine weather.

Flat islet, the north-westernmost islet of the group, lies 6½ miles west-south-westward of Round islet; the surface is generally flat, 35 but the south-western extremity rises to a hill, 300 feet (91<sup>m</sup>4) high; a shoal spit extends about 3½ cables from the middle of its western side, and its eastern and south-eastern sides are very foul. On the western side is a flagstaff. *See* view on chart.

A light is exhibited, at an elevation of 364 feet (110<sup>m</sup>9), from a 40 white tower with a red lantern, 53 feet (16<sup>m</sup>1) in height, situated on the summit of the south-western extremity of Flat islet.

Pigeon House rock, 172 feet (52<sup>m</sup>4) high, lies about 3 cables northward of Flat islet, leaving a boat passage between; its northern side, which may be safely passed, at a distance of from 3 to 5 cables, is 45 steep-to.

Gabriel islet, 70 feet (21<sup>m</sup>3) high, lies 3 cables south-eastward of Flat islet, and is connected with it by reefs; an islet, 6 feet (1<sup>m</sup>8) high, lies close southward of Gabriel islet.

Sandringham reef extends about 4 cables southward of the southern 50 extremity of the 6-foot (1<sup>m</sup>8) islet southward of Gabriel islet (*Lat.* 19° 53' S., *Long.* 57° 40' E.). As the tidal streams set with great strength over Sandringham reef, it should be given a wide berth.

Rip bank, over which the sea breaks occasionally, is of coral form-

*Charts 2899, 748a, 2483.*

*Chart 711.*

ation, with depths of from 7 to 9 fathoms (12<sup>m</sup>8 to 16<sup>m</sup>5) over it, and lies about 3½ cables south-eastward of Sandringham reef.

- Gunners Quoin, an islet, lies about 2 miles north-north-eastward of Cape Malheureux, the northern extremity of the island of Mauritius, the channel between being named Quoin channel; the hill from which this islet takes its name is 518 feet (157<sup>m</sup>9) high, and stands at the western extremity of the islet. Foul ground extends from the northern and southern extremities, and also fringes the eastern side of this islet, but the western extremity is steep-to. See view on chart.

The Blacksmiths are a group of rocks, one being 3 feet (0<sup>m</sup>9) high, and the rest awash, extending about 3 cables east-north-eastward of the northern extremity of Gunners Quoin.

- The Carpenters are three rocks awash, over which the sea breaks heavily, lying within 2 cables south-eastward of the southern extremity of Gunners Quoin.

The east-going stream sets with great strength over The Carpenters and The Blacksmiths, causing dangerous races, which extend 3 miles off Gunners Quoin. Vessels should not pass within a mile of either side of this islet.

Mapu patch, with a depth of 7 fathoms (12<sup>m</sup>8), coral, lies about 3 miles south-eastward of Gunners Quoin and about half a mile from the coastal reef fringing the north-eastern side of Mauritius.

- Tidal streams.**—The streams among the islets attain, during springs, a rate of from 4 to 5 knots, causing dangerous races. At neaps, the rate of the stream seldom exceeds 2 knots. The streams at night are stronger than those during the day, and the strongest streams occur two days after full and change of the moon.

The east-going or flood stream begins 5 hours before the moon's meridian passage and runs for 6 hours; the west-going or ebb stream then makes and runs for 6 hours, there being no slack water. During the east-going stream there is a strong set towards Canonnier point, about 3½ miles west-south-westward of Cape Malheureux, and the reefs off it, the stream sweeping through Quoin channel and round the northern end of Mauritius at a great rate; during and after westerly winds this set is greatly accelerated. On the bank among the islets, this stream sets eastward, but with strong southerly winds it is deflected north-eastward.

- The tidal streams separate at low water off Piment point, about 5½ miles south-south-westward of Canonnier point, the line of separation working towards Rocky point, 2½ miles north-north-eastward of the former point, which it reaches by the time of high water. While the east-going stream is setting round the northern part of the island, a weaker stream is setting southward along the western coast. The west-going stream sets generally about west-north-westward, past the northern end of the island (*Lat.* 19° 59' S., *Long.* 57° 37' E.), but is very little felt on the western side between Canonnier point and Caves point, about 14½ miles south-westward. The inshore stream turns 2 hours before the stream in the offing, and during the last half of the flood, near Gunners Quoin, sets eastward at the rate of 4 knots; on the Mauritius coast, skirting the 10-fathom (18<sup>m</sup>3) line, the west-going stream attains a rate of 3 knots.

**Quarantine station.**—On the south-western extremity of Flat islet is the principal quarantine establishment for Mauritius; and

*Charts 2899, 748a, 2483.*

*Chart 711.*

the whole islet, including Gabriel islet and one cable around them, is included in the quarantine area. It is in signal communication with Port Louis. When the station is actually in use, two yellow flags are kept constantly flying.

**Directions.**—Serpent islet, bearing 009° and opens its own breadth eastward of Round islet, leads about a half and three-quarters of a mile, respectively, eastward of La Caille and Abbé banks; Canonnière point disused light-tower in line with Cape Malheureux, bearing 251°, leads close southward of Abbé bank.

The north-eastern extremities of Flat and Gabriel islets in line, bearing 316°, lead north-eastward of Sandringham reef and of Rip bank; and Canonnière point disused light-tower, bearing not less than 235° and well open of the southern extremity of Gunners Quoin, leads south-eastward.

The directions already given are a sufficient guide when passing between the islets, but attention is directed to the following soundings :—

About 10 miles eastward from Flat islet light-tower there are depths of 29 fathoms (53<sup>m</sup>0), coarse brown sand mixed with broken shells and coral; and, at 6 miles from the light on the same bearing, the same depth, but the bottom black and white speckled sand.

With Flat islet light-tower, bearing about 326°, distant 10 miles, the depth is about 30 to 35 fathoms (54<sup>m</sup>9 to 64<sup>m</sup>0), fine white sand; and a vessel in that position is then about 1½ miles from the barrier reef abreast Amber island, and just within the 100-fathom (182<sup>m</sup>9) contour of the bank; these depths vary as the light-tower is approached from 27 to 25 fathoms (49<sup>m</sup>4 to 45<sup>m</sup>7), the nature of the bottom changing from fine white sand to coarse brown sand mixed with shells and coral.

About 3 miles from the light-tower, on the same bearing, the depth is 23 fathoms (42<sup>m</sup>1), and from thence a course of 270° should be steered. On that course the depths will decrease to 20 and 18 fathoms (36<sup>m</sup>6 and 32<sup>m</sup>9), coarse brown sand and shells, on the tail of the bank, which extends southward of Flat islet, and again deepen to 22 and 23 fathoms (40<sup>m</sup>2 and 42<sup>m</sup>1), coarse brown sand, when Flat islet light-tower bears 014°. A farther run of 2½ miles from this point on the same course will place the vessel out of soundings westward of the bank.

Steam vessels of low power, arriving off Round islet (*Lat.* 19° 51' S., *Long.* 57° 47' E.) during the east-going stream, should pass northward of Serpent islet and give Pigeon House rock a berth of at least one mile.

**Anchorage.**—There is anchorage near the southern end of Flat islet in depths of 9 fathoms (16<sup>m</sup>5), sand and coral, with the light-tower, bearing about 315°, distant 1½ miles, and the summit of Serpent islet in line with the 6-foot. (1<sup>m</sup>8) islet southward of Gabriel islet, bearing 060°. As the sea rises quickly with southerly winds and the holding ground is not good, vessels should proceed to sea on any indication of bad weather. If required, a pilot will be sent from Port Louis to vessels at anchor off Flat islet.

**North-western side of Mauritius.—Coast.—Dangers.**

**Anchorage.**—From Cape Malheureux the coast trends about 3½ miles west-south-westward to Canonnière point, and is fringed by reefs. Malheureux rock, a small coral knoll with a least depth of 4½ fathoms (8<sup>m</sup>7) over it, lies about 1½ miles north-north-westward of Cape Mal-

*Chart 711.*

heureux. Another 5-fathom (9<sup>m</sup>1) coral patch lies about 7 cables eastward of Malheureux rock. About one mile eastward of Canonnier point is a shallow inlet known as Grand bay, with a village on its eastern side. Butte aux Papayers, 530 feet (161<sup>m</sup>5) high, stands about 3½ miles south-south-eastward from the head of the bay, and in line with the black rocks off Matson point, the eastern inner entrance point of the bay, bearing 154°, leads up to that point across the reefs in depths of from 9 to 12 feet (2<sup>m</sup>7 to 3<sup>m</sup>7). There is a semaphore and two signal masts on Butte aux Papayers, but they are no longer in use. After rounding Matson point, the depths increase to 3 or 4 fathoms (5<sup>m</sup>5 or 7<sup>m</sup>3) in the small basin which forms the head of the inlet.

Canonnier point is a projecting point on the extremity of which stands a white tower, formerly a lighthouse.

- 15 This point is fringed by reefs extending as far as 6 cables offshore, close outside which the depths increase so rapidly that the 100-fathom (182<sup>m</sup>9) line lies less than a mile from the point. Amongst the most dangerous of these reefs is Whale rock, with a depth of 4 feet (1<sup>m</sup>2) over it, which lies about 4½ cables northward of the point. The summit of Serpent islet in line with the western extremity of Gunners Quoin, bearing 056°, leads north-westward of the dangers off Canonnier point, see view on chart.

There is a dangerous indraught towards Canonnier point, especially when the east-going stream is running.

- 25 Between Canonnier point and Roche Noire point, about 8 miles south-south-westward, the coast is fringed by reefs extending as much as 5 cables offshore, and is indented in a few places, only two of which, Arsenal and Tombeau bays, are of any importance.

*Chart 3085.*

- 30 Arsenal bay is entered close southward of Piment point (*Lat.* 20° 05' S., *Long.* 57° 31' E.). Pamplémousses river flows into the head of this bay over a dam constructed about 3½ cables up the river. There are depths of about 7 fathoms (12<sup>m</sup>8) in the fairway of the entrance to the bay and of 3½ fathoms (6<sup>m</sup>4) within 1½ cables of the conspicuous cliff at its head on the southern side of the mouth of the river. This bay is too confined to afford good anchorage at any time and, on the least appearance of a westerly wind, it should be quitted at once, as a swell quickly sets in and breaks very heavily over the reefs around.

- Tombeau bay, which is entered between Mortar point, the southern entrance point of Arsenal bay, and Tombeau point, about 1½ miles southward, closely resembles Arsenal bay in most respects, but is more than double its size, and affords good anchorage, in depths of about 5 fathoms (9<sup>m</sup>1), with all but westerly winds. It is easily entered as the coastal reefs are plainly visible at all times of the day. Tombeau river flows into the head of the bay, and is almost dammed by a shifting sand-bar.

*Chart 711.*

- Quarantine station.**—There is a quarantine station on Canonnier point; the sea area adjacent to it, to the distance of one cable, is included within the quarantine limit. When the station is actually in use, two yellow flags are constantly displayed.

*Charts 713, 711.*

**Port Louis.—General remarks.—Landmarks.**—Port Louis is the principal harbour of Mauritius. A reef, on which lies an islet, is

*Charts 711, 2899, 748a, 2483.*

*Charts 713, 711.*

situated on each side of the entrance. On the south-western side lies Barkly islet, narrow and parallel with the channel, and just within its inner extremity stands Fort William on a low point. On the north-eastern side, about 4 cables within the outer edge of the reefs, stands 5 Fort George on Tonnelier or Cooper island, which is connected with the city by a causeway; eastward and north-eastward of this fort is a large marshy lagoon called Mer Rouge, which dries from one to 2 feet (0<sup>m</sup>3 to 0<sup>m</sup>6). In 1928, both Fort William and Fort George were overgrown and covered with trees and scrub, and were not identifiable as 10 forts from seaward.

The entrance is 1½ cables wide between the coral reefs, and is open north-westward; within the harbour opens out into a basin, with shoals extending a considerable distance from both sides. The city 15 of Port Louis stands at the head of this basin.

Port Louis presents a picturesque appearance from the offing, *see* view on chart 713, as steep hills rise immediately behind it, and in the background are the remarkable mountains Pieter Both (page 344) and The Pouce or Thumb peak, 2,650 feet (807<sup>m</sup>7) high, situated about 1½ miles westward of Pieter Both; The Pouce is so named from the 20 resemblance to a thumb held upright, the summit of which is a narrow ridge. These mountains form part of a range lying 2 miles south-eastward of Port Louis, and spurs extend northward from this range.

*Chart 713.*

Conspicuous landmarks at Port Louis are The Citadel or Fort Ade- 25 laide (*Lat.* 20° 10' S., *Long.* 57° 31' E.), on a hill, 289 feet (88<sup>m</sup>1) high, situated in the centre of the city; Cassis church, with two conspicuous square towers, about 1½ miles westward of The Citadel; Signal mountain, 1,061 feet (323<sup>m</sup>4) high, rising over the south-western side of the port, about half a mile east-south-eastward of Cassis church; and 30 a martello tower, with two white vertical stripes, standing on the south-western side of Grand River bay 5½ cables westward of Cassis church.

**Depths.**—As elsewhere round the coast of Mauritius, except at the northern end, sounding is no guide until close inshore. About 1½ miles 35 from the reefs in the entrance to Port Louis, a vessel is in depths of over 100 fathoms (182<sup>m</sup>9); at one mile from them she is in depths of from 30 to 40 fathoms (54<sup>m</sup>9 to 73<sup>m</sup>2), quickly shoaling to 16 and 10 fathoms (29<sup>m</sup>3 and 18<sup>m</sup>3) as the entrance is neared, and to 9, 8, and 7 fathoms (16<sup>m</sup>5, 14<sup>m</sup>6, and 12<sup>m</sup>8) in mid-channel until nearly abreast 40 of the forts. Just inside the forts, there are depths of 5 fathoms (9<sup>m</sup>1), and thence toward the head of the harbour an area about 4 cables long and one cable wide in the approach to the outer wharf had, in 1945, been dredged to a depth of 32 feet (9<sup>m</sup>8). A depth of 3½ fathoms (5<sup>m</sup>9) can be carried into Trou Fanfaron, the eastern extremity of the 45 harbour, on the northern side of which is the dry dock.

**Pilotage.**—Pilotage is compulsory for all merchant vessels of 100 tons register and upwards.

**Dangers.—Buoyage.**—A bank, with depths of less than 5 fathoms (9<sup>m</sup>1), extends about 5½ cables north-westward of Fort George, and is 50 marked at its north-western extremity by a light-buoy, painted in red and white vertical stripes, and exhibiting a *white flashing light every five seconds*; the south-western edge of this bank is marked by red and white chequered buoys, surmounted by cylinders.

*Charts 711, 2899, 748a, 2483.*



*Chart 713.*

A bank, with depths of less than 5 fathoms (9<sup>m</sup>1), extends about 3½ cables north-north-westward of Barkly point, the north-western extremity of Barkly islet, and is marked on its north-eastern side by a  
5 black and white chequered buoy, surmounted by a cone.

After a cyclone it sometimes happens that all the buoys have been washed away.

In the interior of the harbour are many mooring buoys, the positions of which are constantly shifted.

10 *Charts 713, 711.*

**Directions.**—A vessel approaching Port Louis at night from south-westward should pass from one to 1½ miles north-westward of Caves point light, which is situated about 4½ miles west-south-westward of Fort William, and steer a north-easterly course until the light-buoy  
15 at the entrance to the harbour is sighted; when this light-buoy bears 090° it should be steered for on that bearing, and anchorage taken up as directed below.

A vessel approaching Port Louis from north-eastward should pass about 5 miles westward of Flat islet light (*Lat.* 19° 53' S., *Long.* 57°  
20 39' E.), and when that light bears 090° steer a south-south-westerly course; when Caves point light is sighted it should be brought to bear 205°, and steered for on that bearing, until the light-buoy at the entrance to the harbour bears 123°, when a vessel should steer for it on that bearing, and anchor as directed below.

25 The *red* auxiliary light on Caves point should not be opened, coming from either direction, until the light-buoy is sighted.

St. James cathedral spire, which is situated about 3½ cables south-westward of the Citadel, in line with the centre flagstaff on Blyth's store, about 5½ cables north-westward of St. James spire, bearing 136°,  
30 leads through the entrance to the harbour; the Citadel flagstaff in line with Pieter Both (*see* view on chart 713), bearing 123°, leads through the entrance and into the inner anchorage.

**Anchorage.**—The outer and usual anchorage is, in depths of from 15 to 20 fathoms (27<sup>m</sup>4 to 36<sup>m</sup>6), coarse sand mixed with broken coral  
35 and shells, with the light-buoy, bearing between 081° and 171°, distant from 2 to 4 cables. A vessel will have entered the anchorage ground when Gunners Quoin is in line with a conspicuous gap in the trees near Rocky point bearing 039°, *see* view on chart 713, and may anchor as convenient westward of an imaginary line drawn from the light-  
40 buoy to the martello tower on the south-western side of Grand River bay. At night vessels should anchor well within the western limit of the *red* auxiliary light at Caves point, which is visible when bearing not more than 216°.

The quarantine anchorage is in depths of 12 fathoms (21<sup>m</sup>9), coarse  
45 sand and coral, southward of a line joining The Pouce and Fort William, with the light-buoy, bearing about 075°, distant about 6 cables. Vessels in quarantine are, however, allowed to enter the harbour in order to coal in smooth water.

*Chart 713.*

50 The inner anchorage lies within the entrance. A vessel of deep draught should anchor northward of the Quarantine mark on Fort William, and secure her stern to a buoy.

An area in the harbour has been dredged to a depth of 32 feet (9<sup>m</sup>8); its limits are shown by pecked lines on the chart. Vessels

*Charts 711, 2899, 748a, 2483.*

**Chart 713.**

with inflammable cargoes secure between two black mooring bouys north-westward of this dredged area.

If informed previously of a vessel's length and draught, the Harbour Master will arrange a berth, and on the arrival of the vessel send a pilot on board to indicate the precise position. 5

Vessels lie on either side of the channel heading seaward, with two anchors down and with sterns secured to buoys; the inner anchors are laid out and dropped in the shallow water flanking the channel. A vessel over 500 feet (152<sup>m</sup>4) in length cannot turn in the harbour; if 10 she is handy she will be taken in stern first, otherwise she will be berthed in the quarantine anchorage.

**Caution.**—For vessels anchoring in the Outer roadstead (*Lat. 20° 09' S., Long. 57° 29' E.*), the following is the advice of a former experienced Harbour Master:—From the moment of anchoring, be ready to slip and put to sea if necessary. Use chain for a buoy rope, as coral cuts the thickest rope in 48 hours. If the signal is made to put to sea, do so at once, and never attempt to ride out the storm. When slipping from this anchorage, from stress of weather, note the direction in which the wind shifts, and run the vessel in the opposite direction 20 until clear of the land, when an easterly course will take her into fine weather. Never heave-to with the vessel's head toward the shore; in bad weather, local currents are often very strong and uncertain in direction; many vessels, in the belief that they had made a sufficient offing, have been hazarded, and some lost, through neglecting this 25 precaution.

**Signal station.**—There is a Lloyd's signal station on Signal mountain, with which vessels can communicate by means of the International Code of Signals.

**Signals.**—During the cyclone season, from 1st November to 15th May, annually, a storm signal is displayed daily, except Sundays and public holidays, at the Port office, at the head of the harbour at Port Louis (*Lat. 20° 09' S., Long. 57° 30' E.*), to indicate the weather conditions prevailing in the vicinity of Mauritius. The signal consists of four International Code flags and a cone. 35

The upper flag refers to the north-eastern quadrant.

The second " " " north-western "

The third " " " south-western "

The fourth " " " south-eastern. "

(The flags are disposed vertically.) 40

When the signal is headed by a cone the information refers to the area within the circle with a radius of 300 miles.

When the answering pendant is hoisted below the fourth flag it indicates that no information has been received, and that the signal refers to the previous day. 45

Flag W is displayed at the yardarm from 1300 to 1400.

Signification of flags.

- A. There are no indications of disturbed weather.
- B. Weather is unsettled, but there are no indications of a cyclonic storm. 50
- C. Weather is unsettled, and may lead to the formation of a cyclonic storm.
- D. There are indications that a cyclonic storm is forming.
- E. There is distinct evidence of the existence of a cyclonic storm.

*Charts 711, 2899, 748a, 2483.*

*Chart 713.*

- F. The disturbed weather is apparently due to an extra tropical storm southward (southerly buster).  
 G. The weather is clearing, but the sea may still be heavy.  
 5 H. The cyclonic storm is moving south-westward.  
 I. The cyclonic storm is moving southward.  
 J. The cyclonic storm is moving south-eastward.  
 K. The cyclonic storm is moving westward, northward of Mauritius.  
 L. The cyclonic storm is moving eastward, southward of Mauritius.  
 10 On the approach of bad weather the following signals are made to vessels in the harbour and roadstead from the flagstaff of the Port office.

By day :—

- A white flag, with blue horizontal stripes and ball above, at the Port office.  
 15  
 20  
 A red flag, with a ball above.  
 25  
 Send down top-gallant yards and prepare for bad weather. The masters of all ships and vessels in this port are required immediately to repair on board their respective vessels, and half the crew should be kept on board ; vessels at the outer anchorage ought to proceed to sea.  
 Vessels in the port are to strike lower yards and topmasts. Vessels at the outer anchorage to go to sea.

*Note.*—These signals are confirmed by a gun from Fort George (*Lat. 20° 09' S., Long. 57° 29' E.*). Vessels are required to answer the above by hoisting their national ensign at the main.

At night :—

- 30 One blue light at the Port office accompanied by a gun.  
 Vessels at the outer anchorage to proceed to sea forthwith, and vessels in the port to make every preparation for bad weather.

**Wharves.**—Two wharves, one inside and the other outside Trou Fanfaron, are situated near the head of the harbour on the northern side.

The outer one, 496 feet (151<sup>m</sup>2) long, has depths of 32 feet (9<sup>m</sup>8) alongside ; the inner wharf, which is 396 feet (120<sup>m</sup>7) long, has depths of 14 feet (4<sup>m</sup>3) alongside for a length of 240 feet (73<sup>m</sup>1).

- 40 These wharves, and that close north-eastward of the port jetty, about 1½ cables north-eastward of Blyth's store, on which there is a conspicuous granary, are connected with the railway system ; there are depths of from 7 to 8 feet (2<sup>m</sup>1 to 2<sup>m</sup>4) alongside the port jetty.

- 45 There are several small quays for the use of lighters.

**Regulations.**—It is desirable that captains of vessels about to visit Mauritius for the first time should have a general knowledge of these regulations prior to arrival. A book called " Port, Customs, and Quarantine Regulations," in French and English, should be obtained  
 50 on arrival to supplement and complete the extracts from this work given below.

- No merchant vessel of any nationality whilst in the harbour or outer road is permitted to display at any masthead any pendant or thing resembling a pendant, or to fly any other ensign than such as is allowed  
 55 by law.

*Charts 711, 2899, 748a.*

*Chart 713.*

No merchant vessel is allowed to enter the harbour with any gunpowder or other explosive on board, except with special permission from the Harbour Master, nor to ship gunpowder or fire guns in the harbour. The unloading or loading of gunpowder is done at the outer anchorage, as from time to time directed by the Harbour Master. 5

From April to December, though all vessels are to take such precautions for safety as the Harbour Master may direct, two anchors ahead and one anchor astern are deemed sufficient ; but, from December to April, both months inclusive, every vessel is required to be 10 moored with two anchors and chains both ahead and astern. The services of a tug and a mooring lighter can be obtained for laying out anchors.

On any appearance of bad weather, all masters should repair on board their vessels, and be prepared to act in accordance with such 15 directions as may be given by the Harbour Master, or signals made. See Signals, page 352.

In order to keep the harbour channel as clear as possible, outside vessels on either side of the channel are not allowed to load or unload on the outer side of the vessel. In no part of the harbour (*Lat. 20° 09' S., Long. 57° 30' E.*) are guess-warps permitted, nor warps obstructing the harbour. 20

No ballast, dunnage, mats, or rubbish may be thrown overboard from any vessel, nor from the shore into the harbour ; nor may any ballast be thrown overboard in the roadstead in depths of less than 25 30 fathoms (54<sup>m</sup>9). A vessel requiring a boat to take away upper deck and galley sweepings should display flag N of the International Code of Signals.

When any vessel requires police assistance, Flag H of the International Code of Signals should be displayed at the main, and the 30 Police boat will at once repair to the vessel.

Bathing nude, in any part of the harbour between sunrise and sunset, is forbidden under a penalty. Bathing at any time and under any circumstances is exceedingly dangerous, as large sharks have been seen 35 well up the harbour.

The wooden steps at the north-western end of the Customs quays, and the stone steps on the north-eastern side of the fountain, are kept clear for landing places, no boats being allowed to make fast at either place nor to remain longer than is required to embark or land their passengers. Government boats only may land at the 40 jetty in front of the Port office.

All strangers are required to obtain pratique before communicating with the shore, and no vessel can enter any port in Mauritius without receiving pratique, unless permitted to do so in strict quarantine, by the properly constituted authorities. The Health officer in board- 45 ing a vessel is accompanied by a Police officer, and the master of the vessel is required to sign a declaration on a form provided and duly filled up by him ; he has also to give a muster-roll of the crew and a list of passengers. When these formalities have been observed, and if the vessel does not require to be placed in quarantine, a red flag is displayed 50 at the fore as a signal that the vessel has free pratique, or free communication with the shore.

Vessels placed in quarantine display the yellow flag at the fore ; those under suspicion of infectious disease are placed in provisional

*Chart 713.*

quarantine, and display a coloured flag below the yellow flag. From sunset to sunrise, a light is exhibited at each fore-yard arm. Special arrangements are made for coaling vessels in quarantine, in the harbour, the difficulty and danger of doing so in the outer roads being very great.

All vessels sailing from a port where there is a British Consul, and arriving at Mauritius unprovided with a Bill of Health, may be subject to quarantine of observation.

- 10 **Town.**—The city of Port Louis, standing at the head of the harbour, is the capital of Mauritius, and has a railway running along near the sea front, with the principal station at the southern angle of the harbour. It is connected with the telegraph and telephone systems of the island.

The estimated population of Port Louis (*Lat.* 20° 10' S., *Long.* 57° 15 30' E.), in 1940, was 57,803.

Malignant malaria is prevalent in the district.

- Port facilities.**—Small quantities of meat, also fruit and vegetables are obtainable. Water is laid on to the two principal wharves; from 100 to 150 tons per hour can be pumped onboard. Fresh water for 20 boilers is supplied in two water lighters.

Stocks of coal are maintained. Vessels are coaled from lighters, 400 tons per day being the normal amount put onboard.

- There are fuel and diesel oil stocks. Fuelling is carried out alongside the principal wharf; fuel oil is pumped onboard at a rate of 25 250 tons per hour.

Minor repairs can be carried out. There are three 15-ton cranes and several smaller ones, on the quays. There is a Government workshop one mile southward of Port Louis, with cranes capable of lifting 150 tons.

- There is a dry dock, also two patent slips; for dimensions of the 30 dock, see Appendix I, page 373.

There is a large hospital in Port Louis, where seamen are received; there are several other hospitals. There is a Sailors' home.

- A time signal is made from the tower adjoining the Port office. Vessels requiring a chronometer comparison may obtain telephonic 35 time signals from the Observatory between 1300 and 1400.

*Chart 711.*

**Western side of Mauritius.—Coast.—Dangers.—Lights.**—

- From Fort William the coast, which is fringed by a coral reef extending 7 or 8 cables offshore, trends about 3½ miles west-south-westward to 40 Pointe au Sable. Close westward of Port Louis is a break in the coastal reef where Grand river flows into the sea. From Pointe au Sable the coast, which is free from reef, trends about 2½ miles south-westward to Bewsher point, the northern entrance point of Petite Rivière bay which is foul; on the eastern side of this bay stands a village. Caves point 45 lies about 6 cables north-eastward of Bewsher point.

A light is exhibited at an elevation of 152 feet (46<sup>m</sup>3) from a white tower with two red horizontal bands, 97 feet (29<sup>m</sup>6) in height, situated on Caves point.

- An auxiliary light is exhibited, at an elevation of 99 feet (30<sup>m</sup>2), 50 from the north-eastern side of the same tower.

From Petite Rivière point, the southern entrance point of the bay of that name, the coast, which is composed of steep-to rugged cliffs from 12 to 26 feet (3<sup>m</sup>7 to 7<sup>m</sup>9) high, trends about 3½ miles south-south-westward. About 2½ miles south-south-westward of Petite Rivière point

*Charts 711, 2899, 748a, 2483.*

*Chart 711.*

Belle Ile river flows into the sea ; it is shallow and fordable at the entrance. Two other small streams, the Dragon and Galets rivers, flow into the sea within a mile southward of the Belle Ile river. Southward from the southern end of the cliffs the coast, which becomes low and shingly, trends about  $2\frac{1}{2}$  miles southward to the northern entrance point of Tamarin bay (*Lat.*  $20^{\circ} 19' S.$ , *Long.*  $57^{\circ} 22' E.$ ) ; this part of the coast is fringed by a coral barrier reef extending as far as 5 cables offshore. Tamarin bay, on the shores of which stands a small village, is fringed by a reef and has convenient depths for anchorage, but the holding ground is bad, and it is open westward. The Rempart and Tamarin streams flow into the head of this bay.

*Charts 3087, 711.*

Black River bay is an opening in the barrier reef, and lies between the spurs of the mountains about 2 miles southward of Tamarin bay. A village stands on its eastern side ; a ruined battery and a large and conspicuous martello tower stand on Tamarin and Hermione points, the northern and southern entrance points, respectively, of the bay. This bay is easily identified from seaward, by Mount Tamarin, on its northern side, and by the two martello towers ; Mount Tamarin 1,829 feet ( $557^m5$ ) high, and slopes down to the north-eastern shore of the bay. Reefs extend between 5 and 6 cables from both entrance points of the bay, but between them the entrance is 3 cables wide, with depths of from 9 to 17 fathoms ( $16^m5$  to  $31^m1$ ), sand, mud, and coral. All round the bay, the depths are very shallow. Black river flows into the head of the bay ; its shallow bar is subject to constant alterations during freshets in the rainy season, at which time the heat in this bay is almost unbearable. A few fresh provisions can be obtained.

Little Black River bay lies close southward of Black River bay, and has a narrow entrance close southward of Hermione spit, which extends about 6 cables west-north-westward of Hermione point ; this bay extends about 3 miles southward inside the coastal reef. There is deep smooth water for about  $1\frac{1}{2}$  miles inside the entrance, and from this position a shallow arm extends eastward to the coast.

*Chart 711.*

From the entrance to Little Black River bay a reef, about 2 miles wide, on which lie some islets and rocks, extends south-south-westward for about  $3\frac{1}{2}$  miles to a position three-quarters of a mile westward of Marrons point, whence it fringes the coast, extending as much as three-quarters of a mile offshore, as far as Cape Brabant. Ambulante passe, about  $1\frac{1}{2}$  miles north-north-eastward of the cape, is a narrow pass through the reef, fit only for boats, which does not lead to any place but merely inside the barrier reef where the depths have not been ascertained.

Cape Brabant is a low point from which the land rises gradually to The Morne, an isolated flat-topped mountain, 1,809 feet ( $551^m4$ ) high, situated about  $1\frac{1}{2}$  miles north-eastward of the point ; this mountain is an excellent landmark. A bank extends about  $3\frac{1}{2}$  miles westward of Cape Brabant ; the depths vary from 7 or 8 fathoms ( $12^m8$  or  $14^m6$ ) near the edge of the coastal reef to 20, 41, and 50 fathoms ( $36^m6$ , 73 $^m2$ , and 91 $^m4$ ), and then fall precipitously.

**Tidal streams.**—The streams, during springs, set over the bank westward of Cape Brabant (*Lat.*  $20^{\circ} 28' S.$ , *Long.*  $57^{\circ} 18' E.$ ) at rates of from 3 to 5 knots, causing considerable ripples ; the flood stream

*Charts 2899, 748a, 2483.*

*Chart 711.*

sets east-south-eastward and the ebb stream west-north-westward along the southern coast, but immediately northward of the cape the streams follow the coastline, the flood setting north-north-eastward and the ebb stream south-south-westward at a rate of from 2 to 3 knots. The flood stream is said to begin to run about one hour after the moon rises.

*Chart 3087.*

**Directions.—Anchorage.**—A vessel wishing to anchor in Black River bay should, having obtained pratique at Port Louis, steer a mid-channel course between the reefs, which are easily seen ; the sea always breaks heavily over Hermione spit. Anchorage can be obtained, as convenient, in depths of from 6 to 15 fathoms (11<sup>m</sup>0 to 27<sup>m</sup>4) ; the anchorage is fairly good, but with westerly winds a very heavy swell sets in, which is least felt rather towards the northern side of the bay.

15 Vessels should, however, be always prepared to quit this anchorage at short notice.

*Chart 711.*

**Southern side of Mauritius.—Coast.—Dangers.—Beacons.**—From Cape Brabant the coast, for 13 miles east-south-eastward, is fringed by a barrier reef lying from 5 to 7½ cables offshore ; in the bay on the south-eastern side of Cape Brabant, the reef extends 1½ miles offshore. Passe St. Jacques, about a mile east-south-eastward of the cape, is a passage through the barrier reef, which does not lead to any place but merely inside the reef, where the depths have not been ascertained.

Baie du Cap is a wide clear opening in the reef opposite a mountain stream of the same name about 4 miles east-south-eastward of Cape Brabant ; fragments of coral rock are here heaped up by the sea to an elevation of 15 feet (4<sup>m</sup>6). Bras de mer St. Martin and Bras de mer des Citronniers are little shallow inlets to which access is obtained by means of Belle Ombre, a small opening in the reef, which at this part extends 7 cables offshore ; it lies about 5½ miles east-south-eastward of Cape Brabant. There is a beacon on the reef on the eastern side of the entrance to Belle Ombre. Jacotet bay, about 2½ miles eastward of this beacon, is an indentation in the land, with a corresponding opening in the reef ; in the centre lies Gun islet ; the anchorage ground is bad.

Port Souillac, or Savane, lies about 4½ miles eastward of Jacotet bay, but, as deposit, caused by Savane river, a mountain stream, is filling up the creek, it is no longer of use as a port ; a beacon stands on the reef at the eastern side of the entrance to this creek. Port Souillac, which is connected with the railway system, has some quays and a church.

For about 9 miles eastward of Port Souillac, to within about 6 miles of Laverdie point, the south-western entrance point of the southern entrance to Grand Port, the coast is free from barrier reef, and the cliffs, which in some parts are over 100 feet (30<sup>m</sup>5) high, are fairly steep-to, but the coast is broken by several inconsiderable streams. Towards the eastern end of the cliffs, and about 6½ miles south-westward of Laverdie point (*Lat.* 20° 25' S., *Long.* 57° 46' E.), is the Souffleur, a natural cave communicating with an inner passage forming a water-ram, which, when actuated by the waves, sends a jet of water to a great elevation.

A wreck which, in 1942, was conspicuous and about 40 feet (12<sup>m</sup>2)

*Charts 711, 2899, 748a, 2483.*

*Chart 711.*

high, lies stranded on the southern edge of the reef about one mile southward of D'Esny point, which is situated about 4 miles east-north-eastward of the Souffleur.

*Charts 3048, 1401.*

**Grand Port.**—This harbour is an anchorage of some extent situated on the south-eastern side of Mauritius ; it has the disadvantage of its three entrances being exposed to the full force of the south-east trade wind, and the consequent ocean swell. The port consists of a bay sheltered by extensive coral reefs. The shores are everywhere unapproachable except by boats on account of the reefs and banks which border them, and the large sheet of water inside the reef rarely affords a clear navigable space 5 cables wide.

From the southern side of the bay, a reef extends  $2\frac{1}{2}$  miles eastward,  $2\frac{1}{2}$  miles north-eastward, and  $1\frac{1}{2}$  miles northward of D'Esny point, the south-western entrance point of the bay ; its eastern edge is marked by a narrow ridge which dries, and over which the sea always breaks heavily ; this reef extends westward along the northern front of the town of Mahébourg, situated on the south-western side of the bay. Aigrette island, 45 feet ( $13^m7$ ) high, stands on the coastal reef about  $3\frac{1}{2}$  cables north-eastward of D'Esny point.

An extensive detached reef extends about 6 miles north-eastward from a position 9 cables north-north-eastward of Laverdie point, the eastern extremity of the coastal reef just described ; its outer edge lies from 2 to  $2\frac{1}{2}$  miles offshore, and is marked by a narrow ridge which dries, and over which the sea always breaks very heavily, sometimes even when a short distance from the reef the sea appears perfectly calm. Close northward of the south-western extremity of this reef lies Ile de la Passe, 38 feet ( $11^m6$ ) high, which, in 1897, was covered with ruined fortifications and buildings. About  $1\frac{1}{2}$  cables east-north-eastward of Ile de la Passe lies Vaquoas islet, 16 feet ( $4^m9$ ) high. On the south-eastern extremity of the reef, about  $2\frac{3}{4}$  cables east-north-eastward of Vaquoas islet, lies Fouquet islet on which stands a light-tower. Marianne islet, 21 feet ( $6^m4$ ) high, lies about a mile north-north-eastward of Fouquet islet light-tower ; Bird islet, 14 feet ( $4^m3$ ) high, lies close eastward of its eastern extremity, and Fous islet lies a cable south-south-eastward of its southern extremity. About  $1\frac{1}{2}$  miles southward of the northern extremity of the detached reef is an opening, called Danish entrance. Flamand islet and some other sand cays awash at high water, which are continually altering their form, lie in the centre of the part of the reef northward of Danish entrance.

From the north-eastern entrance point of the bay a reef extends about 2 miles eastward and  $1\frac{1}{2}$  miles southward ; its eastern edge is marked by the small rocky Ile Roche, on which stands a beacon, 25 feet ( $7^m6$ ) high, indicating the northern side of North entrance.

Off Southern entrance, southward of Ile de la Passe, the 100-fathom ( $182^m9$ ) line lies about  $1\frac{1}{2}$  miles from the edge of the reef, and the coastal reef extending from D'Esny point (*Lat.*  $20^{\circ} 25' S.$ , *Long.*  $57^{\circ} 44' E.$ ) is bordered by a bank, with irregular depths over it, extending some distance seaward ; here sounding proves a fair guide in thick weather. Off North entrance, the 100-fathom ( $182^m9$ ) line lies farther offshore, depths of 33 fathoms ( $60^m4$ ) being found about 2 miles eastward of the reefs, with a fairly regular decrease of depth up to that entrance, but shoaling very suddenly at the edge of the coastal reef.

*Charts 711, 2899, 748a, 2483.*



*Charts 3048, 1401.*

The general depths in the channel inside the reef between the southern and northern entrances are from 9 to 15 fathoms (16<sup>m</sup>5 to 27<sup>m</sup>4), when clear of the innumerable shoals and rocky heads; except off 5 Devil's point, about 2½ miles west-south-westward of Flamand islet, where the shoals have almost closed the channel, but have left a narrow 11-fathom (20<sup>m</sup>1) pass called the Narrows; and again at Jonchée bar, about 1½ miles southward of Devil's point, where the channel is completely crossed by a bar, over which, for a space of 10 6 cables, depths of from 20 to 24 feet (6<sup>m</sup>1 to 7<sup>m</sup>3), only, can be carried.

**Aspect.—Landmark.**—See views on charts 1401 and 3048.

The Bambou range of mountains rises over the north-eastern part of Grand Port; from it spurs extend to the coast. The most con- 15 spicuous peaks on this range are: Grand Port mountain, near the south-western extremity of the range, about 4 miles northward of D'Esny point, attaining an elevation of 1,586 feet (483<sup>m</sup>4), the outline including the mountain, called Lion's Head, 1,115 feet (339<sup>m</sup>8) high, 4 cables south-eastward, resembling a crouching lion; Bambou peak, 20 2,041 feet (622<sup>m</sup>1) high, about 2½ miles north-north-eastward of Grand Port mountain; The Thumb, a remarkable upright column of stone, 1,784 feet (543<sup>m</sup>8) high, about 1½ cables eastward of Bambou peak; Voltaire's Face, a peak, 1,885 feet (574<sup>m</sup>5) high, one cable northward of Bambou peak, so-called from its resemblance from northward and 25 eastward of Devil's point to Voltaire's profile; the Cat and Kitten peak, 1,552 feet (473<sup>m</sup>0) high, about 4 cables north-eastward of Voltaire's Face, is also conspicuous from northward and eastward of Devil's point.

A conspicuous white bungalow, with a black roof, stands about 30 9 cables north-eastward of Lion's head.

About 3½ miles east-north-eastward of the highest part of Grand Port mountain, a spur from the Bambou mountains terminates in a bluff, 328 feet (100<sup>m</sup>0) high, having on its summit a remarkable black rock; the bluff bears the name of Devil's point, given it by the 35 Dutch in consequence of the supposed magnetic disturbance in its vicinity.

**Tidal streams.**—The tides at Grand Port are much influenced by the wind. With strong south-easterly winds the high-water stand sometimes lasts for several hours at and near Mahébourg (*Lat.* 20° 24' 40 S., *Long.* 57° 42' E.).

In Southern entrance the movement of the water is nearly always outwards, caused apparently by the water thrown over the reefs escaping by the channel. A flood tidal stream may cause still water, and the ebb stream with a strong trade wind may attain a rate of 45 half a knot.

In North entrance, both flood and ebb streams are fairly regular, and, though never strong, vary a good deal in rate.

**Light.**—A light is exhibited, at an elevation of 108 feet (32<sup>m</sup>9), from a grey tower with a red lantern, 84 feet (25<sup>m</sup>6) in height, situated 50 on Fouquet islet. This light was extinguished in 1945.

**Dangers.—Beacons.**—There are numerous shoals and coral heads the position of which are best seen on the charts. Many of them are marked by beacons; of these the principal are Petit Paté, Grand Paté, Le Mât cassé, and Buffs reef. Petit Paté, with depths of less than

*Charts 711, 2899, 748a.*

*Chart 3048, 1401.*

6 feet (1<sup>m</sup>8), lies about 2½ miles northward of D'Esny point ; Grand Paté, with depths of less than 6 feet (1<sup>m</sup>8), about 2 cables westward of Petit Paté ; Le Mât cassé, with depths of less than 6 feet (1<sup>m</sup>8), about 2½ miles north-north-westward of D'Esny point ; and Buffs reef, with depths of less than 6 feet (1<sup>m</sup>8), about 2½ miles north-north-westward of the same point.

*Chart 3048.*

**Southern entrance.—Beacons.—Buoys.**—The entrance to this channel lies between Ile de la Passe and Laverdie point. Westward of Ile de la Passe the channel is 3 cables wide between the 5-fathom (9<sup>m</sup>1) lines ; but in the northern part, where the channel turns westward, it is less than 2 cables wide. There is a small break in the coastal reef close northward of Jacolet point, about 1½ miles north-north-westward of Laverdie point, through which boats can generally pass, although the sea may be breaking heavily over the reef on either side of it. For vessels anchored on Annanas bank, about 4 cables east-north-eastward of Jacolet point, this pass affords a useful means of communication with Mahébourg for small boats, which can go to and fro inside the edge of the reef, keeping a good look-out for coral heads, which are easily seen in smooth water.

A white concrete pyramidal beacon, 10 feet (3<sup>m</sup>0) in height and surmounted by a diamond, stands on the southern side of the channel near the northern edge of the reef about 3½ cables north-north-westward of Jacolet point.

A cylindrical concrete beacon, painted in red and white horizontal bands, 10 feet (3<sup>m</sup>0) in height and surmounted by a ball, stands on the southern side of the channel about 5 cables westward of the above-mentioned beacon ; a similar beacon, surmounted by a triangle, point up, stands on the northern side of the channel near the edge of the shoal extending south-westward from Piment point, situated about three-quarters of a mile north-westward of Jacolet point.

Sappho beacon (*Lat. 20° 23' S., Long. 57° 44' E.*), a white concrete pyramid, 8 feet (2<sup>m</sup>4) in height and surmounted by a ball, marks the southern edge of Sappho reef about 4½ cables north-eastward of Petit Paté beacon.

A red and white chequered can buoy, marking the turn in the channel, is moored about 3½ cables northward of Jacolet point ; a similar buoy marks the southern side of the channel about 9 cables west-north-westward of Jacolet point ; this latter buoy is moored close eastward of a 3-fathom (5<sup>m</sup>5) patch at the north-western end of Olive bank.

A red can buoy is moored near the edge of the shoal extending from Piment point and about 2½ cables westward of the point.

A red and white chequered can buoy marks a 2½-fathom (4<sup>m</sup>1) patch on the southern side of the channel about 4 cables southward of Sappho beacon.

A yellow spherical buoy is moored about 3½ cables north-eastward of Sappho beacon and on the southern end of a shoal with a depth of 2½ fathoms (4<sup>m</sup>6) over it.

*Chart 1401.*

**Danish entrance.**—Danish entrance is not safe, and should not be used. The sea generally breaks right across it, and even in the calmest weather rollers sometimes come in without the slightest warning, and not only break right across the entrance, but up the channel as far as

*Charts 1401, 711, 2899, 748a.*

*Chart 1401.*

Flamand point, the south-western extremity of the part of the detached reef northward of Danish entrance.

**North entrance.**—The entrance to this channel is about one mile 5 wide between Ile Roche and Great South point, the spit extending about 4 cables north-eastward of the northern extremity of the detached reef, but the shoals northward of Great South point, contract the navigable width between the 5-fathom (9<sup>m</sup>1) lines to about half a mile. Diamant reef, about 3 cables eastward of Brisant point, the 10 north-western extremity of the main part of the detached reef, dries 2 feet (0<sup>m</sup>6) ; the sea nearly always breaks over it, and it is easily seen. *Charts 3048, 1401, 711.*

**Directions.**—No pilots can be obtained.

Vessels should not attempt to enter Grand Port after dark, but 15 should heave-to head offshore.

**Southern entrance.**—A vessel approaching from northward and passing down the eastern side of the island, should keep Flat islet light-tower, bearing 328°, astern, as long as it is in sight, and should not alter course to more than 180° until Fouquet islet light-tower bears 20 234°, when course can be altered south-westward so as to pass not less than a mile outside the edge of the detached reef.

A vessel approaching from southward should not bring Fouquet islet light-tower to bear more than 340° until abreast Southern entrance.

The forenoon is the best time for entering as the dangers may then 25 be seen from aloft. As the sea sometimes breaks heavily within the 10-fathom (18<sup>m</sup>3) line, which lies about a mile eastward of Laverdie point (*Lat. 20° 25' S., Long. 57° 46' E.*), that line should not be crossed. The entrance should be approached with the centre of Ile de la Passe in line with the summit of Grand Port mountain, bearing 313°, *see view* 30 on charts 3048 and 1401, or north-eastward of that line, until Fouquet islet light-tower bears about 000°, when a vessel will be near the centre of the channel, and about 7 cables from Ile de la Passe. A vessel should keep in mid-channel.

The conspicuous white bungalow, about 9 cables north-eastward of 35 Lion's head, in line with the western extremity of Ile de la Passe, bearing about 332°, leads, in a depth of about 6 fathoms (11<sup>m</sup>0), about 1½ cables north-eastward of the eastern extremity of Laverdie spit which, with depths of 5 fathoms (9<sup>m</sup>1), or less, over it, extends about 6 cables eastward from Laverdie point.

40 During, and for a time after, strong south-easterly winds, the sea is very high and breaks heavily in the entrance to this channel, notwithstanding the great depths, but after passing Ile de la Passe it subsides into a heavy swell in the channel, although breaking heavily over the reefs. During the four months H.M.S. *Stork* was here, in 45 1897, when careful observations of the state of the sea were registered, the sea, though after observed to be very rough outside, was very seldom breaking inside at all, and never to any height except over the reefs. The general character of the sea was such that at any time during those four months almost the smallest vessel could have safely 50 entered.

**North entrance.**—Bambou peak, bearing about 256°, leads to the entrance ; a vessel should then bring the peak immediately over Devil's point to bear about 232° and open south-eastward of the easternmost small peak of Mont Rouge, which leads in through the

*Charts 711, 2899, 748a, 2483.*

*Charts 3048, 1401, 711.*

entrance 5 cables south-eastward of Ile Roche, to a position 6 cables north-eastward of Pointe de la Grande Passe; Mont Rouge is situated about  $1\frac{1}{4}$  miles south-westward of Devil's point, and Pointe de la Grande Passe 2 miles north-eastward of the summit of Devil's point. 5  
Thence a vessel should proceed in mid-channel taking care to avoid Diamant reef, and the shoals northward of it, and also Brisant point. Diamant reef is always visible and, as already stated, the sea usually breaks over it; the edges of the other reefs are easily seen in a good light. 10

Vessels drawing over 19 feet (5<sup>m</sup>8) should not attempt to proceed through the narrow channels leading to Mahébourg; those of lighter draught should do so only if they have local knowledge, and have a good light in which to see the dangers.

*Chart 3048.*

**Anchorage.—Beacon.**—The first place where a vessel can find shelter near Southern entrance is on Annanias bank, in Horse-shoe bight or Baie Fer-à-Cheval, in depths of from 6 to 9 fathoms (11<sup>m</sup>0 to 16<sup>m</sup>5), sand and coral,  $3\frac{1}{2}$  cables from Ile de la Passe with its south-western extremity bearing about 161° and Fouquet islet light-tower 20  
(*Lat.* 20° 24' S., *Long.* 57° 47' E.) bearing about 102°.

*Charts 3048, 1401.*

The next and most frequented anchorage is about 2 miles farther in, northward of Petit Paté, in a clear space about  $3\frac{1}{2}$  cables wide, with depths of from 7 to 9 fathoms (12<sup>m</sup>8 to 16<sup>m</sup>5), mud. If the beacons 25  
are in place and can be seen, they will be sufficient guides; Marron hill, situated about  $1\frac{1}{4}$  miles westward of Lion's head, bearing about 304° and open south-westward of Mount St. Martin, a conspicuous saddle-shaped hill, 912 feet (278<sup>m</sup>0) high, about  $6\frac{1}{2}$  cables north-westward of Marron hill, also indicates the position of the anchorage. 30  
The western limit for this anchorage is with Lion's head bearing about 000°.

Anchorage can also be obtained in Hercules bay, in depths of from 8 to 12 fathoms (14<sup>m</sup>6 to 21<sup>m</sup>9), about one mile north-eastward of the anchorage northward of Petit Paté. 35

There is also anchorage inside the bight eastward of Jonchée bar in depths of 9 or 10 fathoms (16<sup>m</sup>5 or 18<sup>m</sup>3), which is a good roomy anchorage; also eastward of Devil's point, with that point bearing about 261°, in depths of from 10 to 14 fathoms (18<sup>m</sup>3 to 25<sup>m</sup>6), mud, about 5 cables from the old battery on the point. 40

Small vessels can obtain anchorage in depths of from 6 to 8 fathoms (11<sup>m</sup>0 to 14<sup>m</sup>6) about 2 cables south-south-westward of Grand Paté beacon.

There is also anchorage for small vessels in depths of from 4 to 6 fathoms (7<sup>m</sup>3 to 11<sup>m</sup>0) about  $1\frac{1}{4}$  miles north-north-eastward of Devil's 45  
point; Tazar point, which is marked by a beacon, situated about one mile north-north-eastward of Devil's point, should be rounded at a distance of about one cable, and the anchor let go rather nearer the reef than the coast, so that the vessel will ride in mid-channel with the prevailing wind. In this berth the sea is quite smooth, and it is 50  
reported that a vessel entering with a very foul bottom, and lying there for 3 or 4 days, will leave perfectly clean.

*Chart 3048.*

**Pier.**—A pier projects from the head of Hercules bay; this pier is

*Charts 1401, 711, 2899, 748a, 2483.*

N\*

*Chart 3048.*

being extended in a south-easterly and south-south-easterly direction. Water is laid on to the pier, but it should always be boiled.

*Chart 1401.*

- 5 **Mahébourg.**—Mahébourg the principal town of the Grand Port district, stands on the eastern bank of Chaux river on the south-western side of Grand Port. The village of Grand River South-East lies on the eastern side of the mouth of the river of the same name, which flows into Grand Port about half a mile westward of its north-eastern  
10 entrance point.

Mahébourg and Grand River South-East are connected with the island telegraph and railway systems.

- The best landing place is at Race jetty, near the north-western end of Mahébourg, but if steam boats are used, a small boat should be  
15 in tow to effect a landing as the depths are shallow.

Fresh provisions are obtainable.

*Chart 711.*

- Eastern side of Mauritius.—Coast.—Dangers.**—From Cape Malheureux (*Lat. 19° 59' S., Long. 57° 37' E.*) to Ile Roche, the north-  
20 eastern coast of Mauritius is bordered by a barrier reef, the outer edge of which lies from less than 3 cables to  $2\frac{1}{2}$  miles offshore; in the former case the reef gradually loses its character as a barrier and becomes but a coastal reef. There are few openings navigable even by boats.

- The reef encloses several bays of considerable size and a large space  
25 having depths of from one to 3 fathoms ( $1^m8$  to  $5^m5$ ); into these bays, several small rivers flow, and are probably the means of maintaining the openings in the reef.

- From Malheureux passe, northward of Cape Malheureux, the barrier reef trends about 6 miles east-south-eastward to Passe Latazar. In  
30 this part of the reef there are at least six unimportant openings, only three of which are, however, named; they are Rietz passe, Passe Vacoas, and Passe D'Osborne. The inner waters, though much encumbered by coral heads, are mostly navigable by boats, with local knowledge, and on the coast are several villages and plantations.

- 35 Amber island is a mass of rugged rock with two peaks, the eastern 85 feet ( $25^m9$ ), and the western 65 feet ( $19^m8$ ) high; it lies close offshore with Rouillard point, its northern extremity, about three-quarters of a mile within Passe Latazar; the barrier reef extends a mile farther offshore, as well as partially surrounding the island; abreast its south-  
40 eastern end is the small inlet called Passe St. Gerant.

- Rivière du Rempart, the mouth of which is situated about 3 miles southward of Amber island, is a considerable stream flowing into a coral basin which has depths of from 4 to 7 fathoms ( $7^m3$  to  $12^m8$ ) over a large space, but not within half a mile of the village at the river's  
45 mouth, and the deep part is still farther from the village Poudre d'Or, opposite a creek of the same basin, about 2 miles farther northward. The outer edge of the barrier reef is at this part  $2\frac{1}{2}$  miles offshore, and there are three narrow and shallow openings in it, Passe des Citronniers, Passe des Goelettes, and Passe des Pirogues, of which, Passe des  
50 Citronniers is the best.

Flacq passe, about  $4\frac{1}{2}$  miles south-south-eastward of Passe des Pirogues, is about one mile from the shore, and has a least depth of one fathom ( $1^m8$ ) in it; it is dangerous to attempt to use this channel without local knowledge.

*Charts 1401, 711, 2899, 748a, 2483.*

*Charts 711.*

Trou D'eau Douce, the southernmost gap in the barrier reef, about 6 miles south-south-eastward of Flacq passe and opposite the village of Maho, is used by boats.

*Charts 715, 2899.*

**RODRIGUEZ ISLAND.**—**General remarks.**—This island formerly called Diego Rais, lies about 320 miles eastward of Mauritius. *Chart 715.*

The island is of volcanic formation, composed principally of basalt, with a little upraised coral at each end ; it is hilly throughout with but little level land. A central ridge, 1,300 feet (396<sup>m</sup>2) high at its culminating point, Mount Limon (*Lat. 19° 42' S., Long. 63° 27' E.*), divides the island longitudinally from the eastern extremity for the greater part of its length, and from this ridge, spurs, separated by deep ravines, extend to the northern and southern coasts. The western portion of the island is rather more broken into isolated hills, and is lower than the eastern portion.

*See views on chart.*

The population of Rodriguez island at its last census, in 1931, amounted to 8,202, and the estimated population, in 1944, was about 9,000 ; it is chiefly Roman Catholic. The inhabitants are mostly of African descent, and are either fishermen or farmers.

The huts of the natives are scattered all over the island. The principal villages along the coast are Port Mathurin and Oyster Bay on the northern side of the island, and Rivière Coco and Port South-East on its southern side ; on the central ridge stand the villages of Nassola Lataniers, St. Gabriel, and La Ferme.

Of natural curiosities, there are some perfect basaltic columns, 190 feet (57<sup>m</sup>9) in height, in Oyster Bay valley westward of Port Mathurin ; the Trous d'Argent at the eastern extremity of the island ; numerous beautiful caverns in the coralline limestone on the western and south-western sides, with marvellous stalactites and stalagmites in them, as well as underground halls, some of them over 60 feet (18<sup>m</sup>3) high ; and some beautiful waterfalls.

There are numerous streams in the valleys all over the island, some of them charged with minerals. The water problem is a serious one in the dry season, as very many streams are absolutely dry in the months of November and December.

Fishing, cattle-rearing, and picking acacia seeds are the main industries of the island. Maize, manioc, and sweet potatoes are cultivated, and used as foodstuffs by the natives. Fruit is plentiful in October, November, and December ; and vegetables from May to September. Tobacco is grown on a small scale, mostly in the region of La Ferme. Cattle, goats, sheep, pigs, salt fish, acacia seeds, poultry, maize, beans, and tobacco are exported, chiefly to Mauritius.

The island is a dependency of Mauritius, and is administered by a Resident Magistrate. There is a government medical officer, and a hospital at Port Mathurin.

Rodriguez is connected with the general telegraph system, and has periodical steamer communication with Mauritius and Batavia ; and occasionally with Madagascar.

**Local weather.**—*See pages 52-53.*

**Meteorological tables.**—*See page 62.*

*Charts 2899, 748a, 2483.*

*Chart 2899.*

**Outlying bank.**—A coral bank of considerable extent lies about 90 miles westward of Rodriguez island (*Lat. 19° 42' S., Long. 73° 27' E.*). The least depth charted is 35 fathoms (64<sup>m</sup>0), but there may be less, as  
 5 for about 15 miles around it the bottom is most irregular, depths of from 200 to 400 fathoms (365<sup>m</sup>8 to 731<sup>m</sup>5) being found in close proximity to those of from 1,000 to 2,000 fathoms (1828<sup>m</sup>8 and 3657<sup>m</sup>6).

H.M.S. *Hawkins* when passing over the bank, in 1933, obtained a least depth of 34 fathoms (62<sup>m</sup>2) near the western edge, and reported  
 10 that the bank appeared to extend about 2 miles farther eastward and westward than charted.

*Chart 715, with plan of Mathurin bay.*

**Reef.—Islets.—Bank.**—An extensive flat coral reef borders the coasts of Rodriguez. At the south-eastern extremity of the island it  
 15 is only one-tenth of a cable wide, and at the western end it extends 4½ miles southward, 2½ miles westward, and 4 miles northward. Its position is indicated by breakers in the calmest weather. The outer edge is fairly steep-to, except in a few places, but, with the swell that usually rolls in, the sea often breaks in depths of 10 fathoms (18<sup>m</sup>3)  
 20 more than one cable outside the actual reef. In light winds a vessel can anchor almost anywhere outside the reef in depths of from 10 to 20 fathoms (18<sup>m</sup>3 to 36<sup>m</sup>6).

The surface of the reef is level and, at low water springs, the major portion is dry, whilst some parts have depths of one or 2 feet (0<sup>m</sup>3 or  
 25 0<sup>m</sup>6) over them, leaving a few shallow canoe channels.

There are several narrow openings or passes from the sea through the reef at different points, and a shallow channel exists near the coast nearly all round the island; these passages are used by fishermen, but when rollers set in they are impassable; by means of the  
 30 inner channel communication is kept up by canoes between all parts of the island. They are, as a rule, too shallow for ships' boats except at high water. At Quatre-Vingt Brisants, the south-western corner of the encircling reef, the edge is altogether broken up into detached patches; on this part the breakers are heaviest.

35 Several islets lie on the western part of the reef. Crab islet, 150 feet (45<sup>m</sup>7) high, about three-quarters of a mile westward of Coral point, the southern extremity of Rodriguez island, Frigate islet, 120 feet (36<sup>m</sup>6) high, about one mile north-westward of Crab islet, Catherine islet, 75 feet (22<sup>m</sup>9) high, about one mile west-north-westward of  
 40 Frigate islet, and the neighbouring islets, which are also high, are all basaltic. Cocoa and Sandy islets, lying near the outer edge of the reef, about 2 miles north-westward and 2½ miles north-north-westward, respectively, of Catherine islet, are sand cays about 15 feet (4<sup>m</sup>6) high, and covered with low scrub. Booby and Diamond islets, 55 and 60 feet  
 45 (16<sup>m</sup>8 and 18<sup>m</sup>3) high, respectively, lying about 2 miles west-north-westward and 1½ miles westward of the village of Port Mathurin, are basaltic. Other islets on the south-eastern side of the island are described in connection with Port South-East.

A bank, with general depths of from 20 to 40 fathoms (36<sup>m</sup>6 to  
 50 73<sup>m</sup>1), coral and sand, extends from the reef for from 2½ to 5 miles on the northern side of the island (*Lat. 19° 40' S., Long. 63° 27' E.*); for 6 miles on its eastern side; for 2 miles on its southern side; and for 12 miles on its western side. This bank is steep-to all round, and falls suddenly to depths of 200 fathoms (365<sup>m</sup>8), and over.

*Charts 2899, 748a, 2483.*

*Chart 715.*

**Tidal streams.—Current.**—The tidal streams are not appreciable except in the channels and passes. A fairly constant current sets westward past the island during the trade wind, at a rate of from 5 to 15 miles a day.

**Pilotage.**—Pilotage is not compulsory ; a local boatman, however, is always available for vessels that need advice as to the passes.

**Coast.**—There are several small bays indenting the northern, western, and southern coasts of Rodriguez island, some with deep water inside ; but as their entrances are blocked by the reef they are useless as anchorages.

*Chart 715, plan of Mathurin bay.*

**Mathurin bay.—General remarks.**—Mathurin bay is the only practicable harbour for vessels of deep draught ; it lies on the northern side of Rodriguez island, and is an excellent anchorage formed by an indentation in the coastal reef. It is easy of access ; the bottom is even and the holding ground good, being sand and mud. From seaward, the bay is protected by Middle Ground, a shoal which lies across the entrance, having channels eastward and westward of it, known as Eastern pass and Western pass, respectively, but as the wind during the greater part of the year is south-easterly, the island itself prevents the swell from being felt to any great extent.

There is a least depth of 7 fathoms (12<sup>m</sup>8) in Western pass, and of 4 fathoms (7<sup>m</sup>3) in Eastern pass.

Rollers occasionally set in, and cause a swell in Mathurin bay and heavy breakers on all shoal places ; they come from all quarters and generally last only a few hours.

**Lights.**—Leading lights are occasionally exhibited at Port Mathurin. The front light, at an elevation of about 25 feet (7<sup>m</sup>6), from a flagstaff ; the rear light, at an elevation of about 316 feet (96<sup>m</sup>3), from a white masonry beacon, 18 feet (5<sup>m</sup>5) in height, situated on Mount Charlot about 2½ cables south-south-eastward of the front light.

**Dangers.**—Middle Ground is a large coral shoal, with general depths of from 3 to 8 fathoms (5<sup>m</sup>5 to 14<sup>m</sup>6) over it, and a number of small patches, with depths of less than one to 3 fathoms (1<sup>m</sup>8 to 5<sup>m</sup>5) over them, lie on it ; this shoal does not show generally and, except when rollers are setting in, the sea never breaks on it. But for the narrow Eastern pass, this shoal might be considered as connected with the eastern coastal reef, so numerous are the shoal patches in that channel, the positions of which are best seen on the chart.

Western patch, with a least depth of 3 fathoms (5<sup>m</sup>5), coral, over it, lies on the western side of the Western pass about 1½ miles north-north-westward of the front leading light-structure.

A sunken coil of cable, the position of which is approximate, lay, in 1921, about 8 cables north-north-eastward of the front leading light-structure (Lat. 19° 40' S., Long. 63° 23' E.).

*Chart 715, with plan of Mathurin bay.*

**Directions.**—Western pass is recommended, being wide and free from dangers except for Western patch.

A vessel approaching Mathurin bay from westward should keep Pointe du Sel, near the north-eastern extremity of the island, open northward of Corne point, its northern extremity, until the leading light-structures are in line, bearing 165° ; a vessel should then steer through Western pass with these light-structures in line until Booby



*Chart 715, with plan of Mathurin bay.*

islet bears 252°, when a south-easterly course may be steered for the anchorage. Port Mathurin flagstaff from a distance appears to stand on the eastern extremity of the village.

- 5 Eastern pass is narrow and somewhat intricate, leading between coral heads which cannot always be seen. A vessel entering by Eastern pass, should steer with Diamond islet in line with a notch in the hills at the western end of Rodriguez island, bearing 231° (*see* view B on plan), following the leading mark closely, until Le Piton, a mountain,  
10 1,160 feet (353<sup>m</sup>6) high, about 1½ miles south-south-eastward of the rear leading light-beacon comes in line with a whitewashed cliff, about 1½ miles northward, bearing 181°, when the vessel will be inside the reefs, and may alter course as necessary for anchoring; this course leads through in depths of not less than 4½ fathoms (8<sup>m</sup>2), though very  
15 near to depths of 4 fathoms (7<sup>m</sup>3) on each side, and some 1½- and 2-fathom (2<sup>m</sup>7 and 3<sup>m</sup>7) patches lie not far distant. The whitewash mark is one-third along from the eastern end of the most prominent and blackest cliff on the coast. Should it not show well, the cliff itself is a good mark, and can easily be identified when on the bearing  
20 indicated.

Le Piton shows as a rounded cone, and is quite unmistakable when near Mathurin bay, but when seen from eastward or westward it loses its conical shape.

*Chart 715, plan of Mathurin bay.*

- 25 The Eastern Telegraph Company's station, consisting of five large concrete corrugated iron buildings, stands on Point Venus, a cliffy headland, about 4½ cables east-north-eastward of the front leading light-structure, and is conspicuous; the rear leading light-beacon is also conspicuous.
- 30 **Anchorage.**—In order to avoid the telegraph cables, vessels must anchor, in depths of from 8 to 12 fathoms (14<sup>m</sup>6 to 21<sup>m</sup>9), eastward of a line drawn 350° from Point Venus Observatory.

In 1933, H.M.S. *Hawkins* anchored, in depths of about 10 fathoms (18<sup>m</sup>3), sand, and apparently good holding ground, with Corne point  
35 bearing 099°, and Point Venus, bearing 189°, distant about 7½ cables.

A creek, the entrance to which lies about 3½ cables northward of Point Venus, extends south-westward and southward towards Port Mathurin; it affords good berths for small craft with local knowledge, who place their anchors on the coral, well up the creek, and moor head  
40 and stern.

**Port Mathurin.**—Port Mathurin (*Lat.* 19° 40' S., *Long.* 63° 26' E.), the port and principal settlement of Rodriguez island, is a large village by the shore on a flat mudbank between two narrow valleys, and is nearly surrounded by water at high tide. It is the administrative  
45 centre of the island. The flagstaff, from which a Union Jack is displayed when a vessel is in sight, stands close to the beach.

Oyster Bay is a fishing village standing on the shores of Oyster bay (Baie aux Huîtres), about three-quarters of a mile south-westward of Port Mathurin; it is the site of the government Agricultural Experi-  
50 mental station.

There is a small pier at Point Venus opposite the Eastern Telegraph Company's station. There is also a small pier, furnished with a hand crane capable of lifting 2 tons, off Port Mathurin, which is approached through a narrow boat channel from the upper end of the creek.

*Charts 2899, 748a, 2483.*

*Chart 715, plan of Mathurin bay.*

Landing is very difficult, the coral reefs being hard to avoid, and it should not be attempted after dark. Steamboats and cutters can only proceed a short distance up the boat channel, but small boats can proceed up to the pier. All boats must hug the posts which mark the channel, as a few yards away from the channel, the depths are shoal, with many detached pieces of coral lying about ; if wading is resorted to shoes should be worn as there is a small sluggish fish called the *Laff*, which lies in the mud, and a wound from its poisonous spine is reported to be dangerous.

Fresh provisions are obtainable, but fruit and vegetables can only be procured during certain periods of the year.

There is a resident Port Health officer, and a hospital for natives only.

*Chart 715, with plan of Port South East.*

**Port South-East.—Islets and dangers.—Anchorage.**—Port South-East, which is situated on the southern side of Rodriguez island, is entered through Grande Passe. The entrance is  $1\frac{1}{2}$  miles offshore and about a cable wide ; about 2 cables outside the entrance is a bar, with depths of from 4 to 6 fathoms ( $7^m3$  to  $11^m0$ ) over it, with a narrow 10-fathom ( $18^m3$ ) channel through its centre ; the sea breaks over this bar when rollers set in.

The rocks on the eastern side narrow the entrance, and occasionally throw a roller across. The pass, which has moderate depths, is free from dangers. Owing to the strong tidal streams, the tortuous nature of the channel, and the usual strength of the wind, this pass should not be attempted without local knowledge, except in a case of emergency. At the inner end the channel turns westward, the harbour lying parallel with the southern coast of Rodriguez island.

No marks can be given for the entrance ; but it can be clearly seen from aloft from a distance of one or 2 miles.

Hermitage islet is a rock, 85 feet ( $25^m9$ ) high, surrounded by a reef, which stands in the centre of the harbour.

Several islets lie on the coral reef south-westward of the harbour ; Misel islet, about 2 miles westward of Hermitage islet, Gombrani islet (*Lat.  $19^{\circ} 46' S.$ , Long.  $63^{\circ} 25' E.$* ), 20 feet ( $6^m1$ ) high, about 6 cables south-south-eastward of Misel islet, Pierrot islet, 20 feet ( $6^m1$ ) high, about 3 cables eastward of the south-eastern end of Gombrani islet, and Flat islet, 10 feet ( $3^m0$ ) high, 4 cables south-westward of Pierrot islet.

Port South-East is available for vessels drawing up to 20 feet ( $6^m1$ ). It is well sheltered being protected by the reef, and has a clear space eastward of Hermitage islet with depths of from  $3\frac{1}{4}$  to 10 fathoms ( $5^m9$  to  $18^m3$ ), mud and sand, good holding ground. It would be a useful anchorage, were it not for the difficulty of entry and exit.

*Charts 1921, 748a.*

**ILE AMSTERDAM AND ILE SAINT-PAUL.**—These two isolated islands of volcanic origin, situated in the southern ocean, about 1,265 and 1,325 miles, respectively, south-eastward of Rodriguez island, are visible, in clear weather, Ile Amsterdam, from a distance of 60 miles, and Ile Saint-Paul from a distance of 30 miles. From April to October they should be approached with great caution as strong westerly winds are then prevalent. Seaweed, which becomes detached

*Charts 2899, 748a, 2483.*

*Charts 1921, 748a.*

from the islands, is carried to sea by the north-east-going current (*see* page 18), and collects into small masses, which are difficult to see.

These islands have been declared sanctuaries for the preservation of all forms of wild life.

*Chart 1921, with plan of Amsterdam island.*

**Ile Amsterdam.**—**General remarks.**—**Aspect.**—Ile Amsterdam the larger and higher of the two islands, has a verdant aspect; it attains an elevation of 2,987 feet (910<sup>m</sup>4). It is uninhabited.

10 Ile Amsterdam was discovered by Magellan's companions (Magellan himself having been killed in the Phillipine islands on the 27th April, 1521), in the *Victoria*, on the 18th March, 1522, during that vessel's voyage round the world. It was named New Amsterdam by Antonio Van Dieman, who sighted it on the 17th June, 1633, from the Dutch  
15 vessel *Nieu Amsterdam*. The Dutch navigator, Vlaming, anchored off its southern extremity, in 1696, and it has been subsequently visited by several eminent navigators. It was partially examined, in 1873, by H.M.S. *Pearl*. The French flag was hoisted here, in 1892, by the French war vessel *Bourdonnais*.

20 The western side of the island is rugged with high inaccessible cliffs; on the other sides the slope is more gentle, and the coast is formed of irregular cliffs about 100 feet (30<sup>m</sup>5) high, *see* views on plan. There is no verdure on the western side; the southern part is covered with tufts of long grass; some stunted trees and thick grass grow on the  
25 north-eastern side near the coast. Pointe d'Entrecasteaux, on the western side, about half a mile north-westward of Pointe Vlaming, the southern extremity of the island, is remarkable for its pointed summit and jagged edges, *see* view A on plan. Pointe Vlaming, when bearing 112°, appears as a precipitous bluff. The coasts of the island are free  
30 from dangers, except near the points which are bordered by breakers, and for some rocks, above water, which lie about 1½ miles south-south-eastward of Hosken point (*Lat.* 37° 40' S., *Long.* 77° 33' E.), the north-eastern extremity.

Penguins, seals, and myriads of sea-birds are found on the western  
35 side of Ile Amsterdam.

Chaussée des Otaries, the eastern indentation on the northern side of this island, is the only beach.

Landing is possible close southward of Hosken point, where there is a landslip; in calm weather it is possible to land by jumping on to  
40 some flat rocks, which extend a short distance, and afford a little shelter, but with a swell, and winds between north and north-east, landing would be very difficult. In 1880, landing was effected from H.M.S. *Raleigh* about 1½ miles southward of Hosken point. In November, 1903, landing was effected with difficulty from H.M.S. *Terpsichore*  
45 on the northern side of the island, close eastward of Pointe de la Recherche, the north-western extremity.

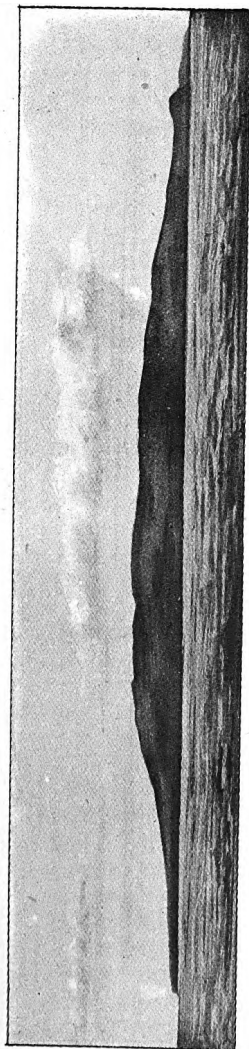
**Anchorage.**—**Tidal streams.**—The anchorages off this island are temporary only.

The *Dives* anchored in the bight off the landing place close south-  
50 ward of Hosken point, in depths of from 10 to 15 fathoms (18<sup>m</sup>3 to 27<sup>m</sup>4), fine black sand, with Hosken point bearing 305°, and the southern point of the bight 162°. The *Pearl* had previously anchored here, in 1873.

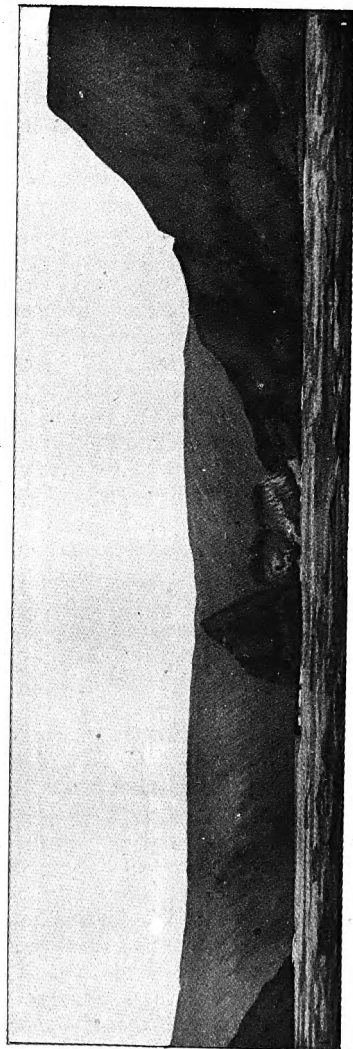
The *Dives* was obliged to abandon this anchorage, and anchored off

*Charts 748a, 2483.*





Ile Saint-Paul.



*Rocher Quille.  
(Ninepin rock.)*

Ile Saint-Paul. Entrance to the crater basin.

*(Originals dated prior to 1911.)*

*Chart 1921, with plan of Amsterdam island.*

the middle of the eastern side of the island, in depths of 12 fathoms (21<sup>m</sup>9), with Hosken point bearing 317°, and some conspicuous red patches, the only ones on the cliffs forming this coast, bearing 234°.

The *Dives* reported that during two visits she had spent four days at this latter anchorage. Both times she experienced bad weather, but she considered that, in all conditions, this anchorage was better than that off Ile Saint-Paul. The only winds to fear are those from eastward, which are rare.

The tidal streams are strong off this coast, and vessels seldom lie head to wind.

**Depôt.—Supplies.**—The *Eure*, in 1893, established a depôt in a cavern in the side of a hill about 2½ cables westward of the landing place at Hosken point; it contained food and clothing. A board fixed to two uprights was erected at the entrance to the cavern, with the inscription "France, Vêtements pour naufragés, Eure, Janvier, 1893."

In 1913, the depôt consisted of 7 barrels, two of which were open; the contents of the latter consisted of tins of meat in a very decayed condition, as are probably the contents of the other barrels.

Three wooden cases, marked with a red cross, and a water-tight tin case containing matches, was left by the German South Polar exploring vessel *Gauss*, near the landing place, just above high water mark, and close to where the flagstaff stood.

Fish and lobsters are abundant near the landing place (*Lat.* 37° 40' S., *Long.* 77° 33' E.). There are some herds of cattle. Cabbages, celery, parsley, and mushrooms grow on the island.

*Chart 1921, with plan of St. Paul island.*

**Ile Saint-Paul.—General remarks.**—Ile Saint-Paul (*see* views on plan and facing this page) attains an elevation of 890 feet (271<sup>m</sup>3), and a considerable part of its area is occupied by a circular basin, with depths of about 33 fathoms (60<sup>m</sup>4) in the middle, formed by the crater of a volcano. The north-eastern side of the crater has broken down, and the basin may be entered over a bar, about half a cable wide, with depths of 6½ feet (2<sup>m</sup>0) over it, at high water, springs. The other sides of the crater slope down to the sea.

There are no trees on the island, but it is covered with grass and rushes, the latter being sometimes 7 feet (2<sup>m</sup>1) high. There are few seal here, but numerous penguins. Wild goats, wild cats, rats, and numerous rabbits are found here. Fish, shell-fish, and cray-fish are abundant.

The French established a settlement here, in 1840, which did not exist for long. In 1853, the island was surveyed by Captain H. M. Denham, H.M.S. *Herald*. In 1874, the French mission for observing the transit of Venus spent over three months here. The French war vessel *Bourdonnais*, in 1892, hoisted the French flag here.

The bar fronting the basin is sometimes dangerous on account of breakers caused by the swell; this is chiefly the case when there are light easterly winds and a high barometer. Schooners from Ile de la Réunion secure along the northern side of the basin, where they lie in safety, but severe squalls have been experienced here which have caused damage to vessels secured there.

Vessels pass daily in view from the summit of the island.

**Tidal streams.**—The tidal streams often attain rates of 2 or 3 knots over the bar.

*Charts 748a, 2483.*

*Chart 1921, with plan of St. Paul island.*

About 9 cables off the north-eastern side of the island the flood stream sets north-westward from low water to 2 hours after high water, or for 8 hours, and the ebb stream sets south-eastward from 2 hours  
5 after high water to low water.

About 4 cables off the north-eastern side of the island the flood stream sets south-south-eastward from low to high water, and the ebb stream sets north-north-westward from high to low water; the streams attain a rate of about one knot at springs.

10 The observations on which this information is based were taken in the year 1853.

**Off-lying rocks.**—Ilot Nord (North islet), about  $5\frac{1}{2}$  cables eastward of Smith point, the northern extremity of Ile Saint-Paul, lies near the northern edge of a rocky spit which extends one cable in a north-north-  
15 easterly direction from the shore; Rocher du Milieu (Middle rock) lies about one cable offshore 5 cables east-south-eastward of Ilot Nord.

Rocher Quille (Ninepin), lying about half a cable offshore close northward of the entrance to the crater (*Lat.*  $38^{\circ} 43' S.$ , *Long.*  $77^{\circ} 31' E.$ ), is connected with the shore west-south-westward by a rocky  
20 spit. It is composed of horizontal layers of lava piled regularly one on the other to an elevation of 261 feet ( $79^m5$ ); the face of these layers is cracked and divided by perpendicular fissures, many of which are filled with veins of obsidian or volcanic glass.

Banc Roûre, with a depth of one fathom ( $1^m8$ ), over which the sea  
25 breaks at intervals, lies about one mile south-eastward of Rocher Quille and  $1\frac{1}{2}$  cables offshore.

**Anchorage.**—**Tidal stream.**—**Winds.**—There is anchorage, in depths of from 13 to 27 fathoms ( $23^m8$  to  $49^m4$ ), black sand, east-north-eastward of the entrance to the basin. The island is too small  
30 to afford shelter from westerly squalls, and it is better in such conditions to proceed to sea. The tidal streams are strong, and a vessel rarely, even during fresh breezes, lies head to wind; the swell always runs round one of the extremities of the island, causing vessels to roll.

One of the better anchorages used by the *Dives*, in 1875, is, in depths  
35 of 13 fathoms ( $23^m8$ ), black sand, good holding ground, with the northern extremity of the crater bearing  $252^{\circ}$ , Hutchison point, the south-eastern extremity of the island, bearing  $160^{\circ}$ , and Rocher du Milieu bearing  $302^{\circ}$ .

Vessels can lie in safety at this anchorage with winds from between  
40 north-north-west and north-west. Fresh or strong south-westerly winds are accompanied by heavy squalls that blow down the sides of the crater, and the squalls alternate with calms. Gales from south-east to north are few at any time of the year, but a vessel should be prepared to put to sea at short notice in case of one arising.

45 **Depôt.**—**Supplies.**—The depôt hut, built by the *Eure*, in 1893, is of rough stones, with a thatched roof, and stands on the northern side of the crater near the jetty. It contained food and clothing stowed in 13 casks.

In 1903, when H.M.S. *Terpischore* visited the island, only 10 casks  
50 remained; the hut was in fair condition, but the roof required repair. She also found four boats, strongly built and in good condition, hauled up on the beach. In 1910, when s.s. *Wakefield* visited the island the hut was in fair condition, but only seven full casks remained. The boats were still there.

*Chart 1921, with plan of St. Paul island.*

On the door of the hut is the inscription "France, Vivres et Vêtements pour naufragés, Eure, Janvier, 1893."

A small pool of boiling water exists at low water near the hut. A path runs north-westward from the hut to a pool, where at low water hot fresh water will be found; this water is however sulphurous and hardly fit for drinking. From the summit of the highest hill northward a track runs north-westward to three pools, where fresh water was found 30 days after there had been rain; there are several similar pools in the southern part of the island.

Rabbits, sea-birds and their eggs, fish, and shell-fish abound, affording an unlimited supply of wholesome food. Eastward of a white patch on the side of the crater above the hut (*Lat. 38° 42' S., Long. 77° 31' E.*) is a landslide, at the summit of which grow some vegetables.

*Charts 748a, 2483.*



## LIST OF PORTS AVAILABLE FOR UNDER-WATER REPAIRS, with details of largest Dry or Floating Dock or Patent Slip at each Port.

NAME OF PORT AND DOCK	Length from Bilge of Caisson or Mitre Post of gates at		Breadth of Entrance at		† Distance (below(+) above(—) Chart Datum level of	Sill	Blocks at		Springs rise	Maximum Depth over Blocks			REMARKS
	Coping Head	Floor Head	Coping	MHWS level			Entrance	Head		Forward	Aft	Lifting Power	
	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Tons		
SEYCHELLES, Mahé island, Port Victoria : Slipway . . . . .	300	60	—	—	—	§	§	§	5.2	4	7	50	In a poor condi- tion. § Height of blocks not known. Figures based on assumed height of 4' 6".
MADAGASCAR, Diégo- Suares : Dry Dock . . . . .	639-1	620-9	101-7	100-9	29-6 Below Lowest Water	28-3 +	26-9 +	7-5	—	—	—	—	In 1927 it was reported that this dock could receive vessels 574 feet in length or with an alteration to the keel blocks of 623 feet in length.

|| An increase of 27 feet in length can be gained by placing caisson in outer stop.

\* In the case of Floating Docks, Patent Slips, &c., Column (1) = Extreme Length. Column (2) = Length on Blocks or Cradle.

† In the case of Floating Docks, Column (3) = Breadth at Top. Column (4) = Breadth at bottom of Dock.

‡ In order to find the depths on Sill, &c., the quantities in columns (5), (6) and (7), should be applied according to sign to the predicted or calculated height of tide as obtained from the Admiralty Tide Tables.



## APPENDIX II

LIST OF PRINCIPAL PORTS, SHOWING PARTICULARS  
OF DEPTHS, &c.





PORT	Depth below Chart datum level		Rise of Tide		Remarks
	In channel of approach	In anchorage	Spgs.	Nps.	
Port Victoria : Seychelles.	39 feet	Outer 10 to 13 fms. Inner 5 to 10 fms.	Feet 5.1	Feet 3.9	
Dzaoudzi : Ile Mayotte	Passe M'Zam- bourou 5 fms. Passe Bandéli, 21 feet.	Baie de Pam- anzi 8 to 14 fms. South of Ilot Dzaoudzi 11 fms.	13.1	9.5	
Hellville : Madagascar.	Western 11 fms. South-eastern 8 fms. Passe Lokobé 4½ fms.	4½ to 11 fms.	12.3	8.7	
Analalava : Madagascar.	Passe du Nord 5½ fms. Passe du Milieu 23 feet. Passe du Sud 3½ fms.	10 to 14 fms.	14.0	10.5	
Majunga : Madagascar.	Chenal du Nord-Est 6½ fms. Chenal du Nord 6 fms. Chenal du Nord-Ouest 7 fms. Chenal de l' Ouest 3½ fms.	2½ to 5½ fms.	15.1	10.9	
Tuléar : Madagascar.	Passe du Nord 7 fms. Passe du Sud 7 fms.	3½ to 8 fms.	9.9	7.1	
Diégo-Suarez : Madagascar.	8 fms.	4½ to 13 fms.	7.5	5.5	

LIST OF PRINCIPAL PORTS, SHOWING PARTICULARS OF DEPTHS, &c.  
(continued).

PORT	Depth below Chart datum level		Rise of Tide		Remarks
	In channel of approach	In anchorage	Spgs.	Nps.	
Tamatave : Madagascar.	Passe du Nord- Est 6 fms. Passe du Nord 11 fms. Grande Passe de l'Est 8 fms. Passe du Sud 5½ fms.	11 to 12 fms.	Feet 3·0	Feet 2·1	
Port des Galets	19 feet	3½ to 4½ fms. in basin.	2·3	1·8	
Port Louis : Mauritius.	5 fms.	Outer 15 to 20 fms. Inner 32 feet.	2·1	1·4	
Mathurin bay : Rodriguez.	Western pass 7 fms. Eastern pass 4 fms.	8 to 12 fms.	4·7	3·3	

## APPENDIX III

## LIST OF SPOTS SUITABLE FOR MAGNETIC OBSERVATIONS

Place.	Lat. Long.	Position.
Seychelles islands :— Mahé island, Port Victoria . . . .	4° 37' 13" S. 55° 27' 35" E.	Near the north-eastern corner of Coal islet. Marked by a square block of concrete from which the black inner navigation beacon bears 102° 57' 58".
Amirante islands, Ile Des-roches . . . .	5° 41' 14" S. 53° 40' 34" E.	About 800 yards from edge of beach on the inside of a track. A log of wood marks the spot  in it).
Coetivy island . . . .	7° 09' 46" S. 56° 14' 56" E.	About 300 yards southward of settlement flagstaff and 20 yards from the high-water mark. A coral block is buried 18 inches deep, 129°, 52 feet from a casuarina tree with three trunks, having  cut on its southern trunk, 5 feet from the ground.
Chagos archipelago :— Salomon islands . . . .	5° 18' 19" S. 72° 15' 06" E.	Western extreme of Ile de la Passe, just above high-water mark. Marked by a block of concrete with 5 copper nails in it : . :
Diégo-Garcia. . . .	7° 13' 58" S. 72° 26' 00" E.	At beach end of a road leading to the lagoon, 2 cables northward of Pointe de l' Observatoire, beneath some prominent coconut palms. Marked by flat coral slab buried one foot deep and marked by a cairn. It is placed on the southern side of the path, and about 6 feet from the landward edge of the sand.
Rodriguez :— Port Mathurin . . . .	19° 40' 36" S. 63° 25' 48" E.	Near the Port flagstaff, with the Eastern Telegraph Company's flagstaff bearing 58° 45' 11";  Booby islet bearing 294° 31' 11" and  House bearing 203° 43' 11".
Providence island :— Cerf island . . . .	9° 31' 40" S. 50° 59' 39" E.	On the westernmost of the sand cays forming Cerf island. A large wooden peg, covered with a mound of sand on which is a large piece of driftwood, marks the spot. It bears 341°, distant 45 yards from the middle of a pool of fresh water. The top of a large heap of wreckage bears 183° 55'.01".

## INDEX

	Page		Page
Abattoir beacon . . . . .	319	Ambamonetsimany . . . . .	162
Abbé bank . . . . .	345	Ambaniou . . . . .	318
Abnormal magnetic variation . . . . .	21	Ambanitazana, Mount . . . . .	278
Abord, Rivière d' . . . . .	341	Ambanizana river . . . . .	284
Achombo beacons . . . . .	128	Anchorage, directions . . . . .	285
Acua, Pointe . . . . .	130	Ambanoro . . . . .	177
Adelaide bank . . . . .	81	Anchorage . . . . .	180
Adelaide, Fort . . . . .	349	Ambanoro, Baie . . . . .	177
Adriamihali rock . . . . .	253	Ambarabe mountain . . . . .	323
Adriens shoal . . . . .	67	Ambararata . . . . .	158
Afombani, Pointe . . . . .	124-125	Ambararata, Baie d, Baie Andra-	
African islets . . . . .	82, 82-83	maimba . . . . .	158
Anchorage . . . . .	83	Ambararata, Baie d, Baie d'Amp-	
Tidal streams . . . . .	82	asindava . . . . .	182-183
Agalega islands . . . . .	100-102	Anchorage . . . . .	183
Anchorage, beacons, directions . . . . .	101	Ambararata, Pointe . . . . .	205, 206
Aspect . . . . .	100	Ambariobé . . . . .	178
Pilots . . . . .	101	Ambariomena . . . . .	178
Tidal streams . . . . .	101-102	Ambariomena-kély . . . . .	178
Weather . . . . .	45-46	Ambarionaomby, Pointe . . . . .	178
Agulhas current . . . . .	9, 11	Ambariotélo . . . . .	178
Aigle, Pointe de l' . . . . .	266	Ambariotsimaramara . . . . .	176
Aigrette island . . . . .	357	Ambaro, Baie d' . . . . .	171
Aigrettes, Cap des . . . . .	340	Winds . . . . .	163, 171
Aigrettes, Pointe des . . . . .	340	Ambasavaka, Rochers . . . . .	161
Aiguille, Rocher . . . . .	147	Ambataloborona, Rocher . . . . .	315
Air lights . . . . .	26	Ambato, Mont . . . . .	171
Aircraft distress signals . . . . .	26	Ambato, Presqu'île d' . . . . .	163
Ajangua, Iles . . . . .	134	Ambato Rano . . . . .	181
Ajangua, Récif . . . . .	136	Ambatoarara . . . . .	151
Akao, Nosy . . . . .	273	Ambatobé . . . . .	160
Light . . . . .	273	Ambatoharana, Nosy . . . . .	282
Alanana, Nosy . . . . .	301	Ambatolampy . . . . .	210
Alandrota, Baie . . . . .	170	Ambatomanan-Sandroka . . . . .	286
Anchorage . . . . .	170	Ambatomifoko, Pointe . . . . .	202, 203
Alankirimy, Pointe . . . . .	169	Ambatomilay . . . . .	188
Albatros, Roche . . . . .	258	Ambatomisiotaka, Pointe . . . . .	236
Albatross island . . . . .	331	Ambatomkéna, Nosy . . . . .	271
Albatross rocks . . . . .	69	Ambatonifanga, Nosy . . . . .	282
Albatross shoal . . . . .	226	Ambatorangitsy, Nosy . . . . .	152
Albrand, Pointe . . . . .	291	Ambatouro . . . . .	291
Light . . . . .	291	Anchorage . . . . .	291
Aldabra islands . . . . .	90-92	Ambatovorona . . . . .	315
Anchorage . . . . .	92	Ambatozavavy, Baie d' . . . . .	175
Tidal streams . . . . .	92	Anchorage . . . . .	176
Alligator rock . . . . .	67	Ambatu-rao . . . . .	291
Alphonse island . . . . .	87-88	Ambavanibé, Baie . . . . .	145, 147
Anchorage . . . . .	88	Anchorage, directions . . . . .	148
Tidal streams . . . . .	88	Tidal streams . . . . .	148
Amaha, Pointe . . . . .	133	Ambavatoby, Baie d' . . . . .	183-184
Amarella sand . . . . .	226	Anchorage . . . . .	184
Ambahivavy, Pointe d' . . . . .	181	Aspect . . . . .	183
Ambakaka, Baie d' . . . . .	282	Directions . . . . .	184
Ambalaombé, Pointe . . . . .	291	Ambenja . . . . .	207

	Page		Page
Ambenja, Rivière d' . . . . .	206	Ampajony cliffs . . . . .	205, 208
Amber, Cape . . . . .	145	Ampajony, Passe d' . . . . .	209
Amber island . . . . .	362	Ampalasi . . . . .	258
Amber, Mount . . . . .	145	Ampamonty, Baie . . . . .	164, 165-166
Ambinantsandra . . . . .	146	Anchorages, directions . . . . .	165-166
Ambinasakaleo . . . . .	312	Ampamonty, Banc . . . . .	165
Ambitsika, Pointe . . . . .	285	Ampanasina, Baie . . . . .	145, 147
Amboaboaka, Pointe . . . . .	183	Ampanasay, Pointe d' . . . . .	172
Amboahangy, Baie d' . . . . .	183	Ampandikoarana, Rivière . . . . .	231
Anchorage . . . . .	184	Ampandrafitra, Nosy . . . . .	270
Amboaniho . . . . .	210	Ampandrozono, Pointe . . . . .	279
Amboaniho, Pointe, Baie de		Ampangala, Pointe d' . . . . .	169
Bombétoko . . . . .	214	Ampangataha, Rocher . . . . .	212
Amboaniho, Pointe, Baie de Maha-		Ampangorinana . . . . .	178
jamba . . . . .	207	Ampanihi . . . . .	257
Amboday, Pointe d' . . . . .	173	Ampano, Rivière . . . . .	282
Ambodiforatra . . . . .	284	Ampanobé, Rivière . . . . .	278
Anchorage . . . . .	285	Anchorage . . . . .	279
Ambodifototra . . . . .	293	Ampandohara, Pointe . . . . .	169
Ambodilamoty, Pointe . . . . .	272	Ampanomilay, Pointe . . . . .	168-169
Ambodimadiro, Pointe . . . . .	182	Ampanytsoha, Récif d' . . . . .	169
Amboditavolo sawmills . . . . .	290	Amparafaka, Cap . . . . .	217
Ambodivahibé, Baie d' . . . . .	270	Aspect . . . . .	218
Anchorage . . . . .	270-271	Amparihingidro, Rivière d' . . . . .	214
Directions . . . . .	271	Ampasikély . . . . .	199
Tidal streams . . . . .	270	Beacons . . . . .	199
Ambodivahibé, Pointe d' . . . . .	270	Light . . . . .	199
Ambohibé, Baie d'Ampasilava . . . . .	240	Ampasilava . . . . .	239
Ambohibé, Rivière Manombo . . . . .	247	Ampasilava, Baie d' . . . . .	236, 239
Ambohibiri . . . . .	153	Anchorages, directions . . . . .	239
Ambohimirahavavy, Mont . . . . .	181	Aspect . . . . .	239
Ambohiposa . . . . .	161	Landmark . . . . .	238
Ambohitrakoholahi . . . . .	146	Tidal streams . . . . .	239
Ambohitramporia, Cap . . . . .	260	Ampasilava, Pointe . . . . .	206
Ambohitriomby, Pointe . . . . .	169	Ampasilavadambao . . . . .	244
Ambohitrosy . . . . .	220	Ampasimanahy . . . . .	165
Ambohitsambo . . . . .	206	Ampasimanoro . . . . .	253
Ambohitsara . . . . .	313	Ampasimanuru . . . . .	254
Amboliboso, Pointe . . . . .	192	Ampasimeloka . . . . .	317
Ambolibozo, Pointe . . . . .	207	Ampasimena . . . . .	183
Amboloboza, Baie d' . . . . .	272	Ampasimena, Baie d', Baie Andra-	
Ambondro, Baie de Bombétoko . . . . .	210	maimba . . . . .	159
Ambondro, Morondava . . . . .	234	Ampasimena, Baie d', Iles Mitsio . . . . .	169
Ambondro, Roche d' . . . . .	174	Anchorage . . . . .	170
Ambondrombé . . . . .	211	Ampasimenakély, Pointe . . . . .	170
Ambongoabo, Massif de l' . . . . .	270	Ampasindava . . . . .	166
Amborovy . . . . .	210	Ampasindava, Baie . . . . .	166
Ambouis, Montagne d' . . . . .	323	Ampasindava, Baie d' . . . . .	181-182
Amboulbouzekély, Baie d' . . . . .	271	Anchorages . . . . .	182
Amboutifouth . . . . .	293	Aspect . . . . .	181-182
Ambozaka mouth . . . . .	232	Ampassipohe, Pointe d' . . . . .	175
Ambozoména, Pointe . . . . .	202	Ampio, Baie d' . . . . .	269
Ambre, Cap d' . . . . .	259	Ampirimpirina, Pointe d' . . . . .	210, 212
Aspect . . . . .	146	Ampitsipitsika . . . . .	216
Currents . . . . .	9, 14, 15, 17	Ampoahana, Pointe d' . . . . .	183
Directions . . . . .	146-147	Ampombiabo . . . . .	192
Tidal streams . . . . .	146, 147, 260	Amponkarana, Baie . . . . .	155-156
Ambre, Montagne d' . . . . .	145, 261	Anchorage . . . . .	156
Ambulante passe . . . . .	355	Amporaha . . . . .	187
Amirante isles . . . . .	81-86	Amsterdam, Ile . . . . .	367-368, 368-369
Anchorages . . . . .	83, 84, 85, 86	Anchorage . . . . .	368-369
Currents . . . . .	82, 86	Aspect . . . . .	368
Tidal streams . . . . .	82, 83, 84, 85-86	Current . . . . .	
Weather . . . . .	45-46	Tidal streams . . . . .	369
Amis, Baie des . . . . .	267	Anakao . . . . .	255
Amoha, Pointe . . . . .	133	Anakao, Banc Est d' . . . . .	229
Amoro, Pointe, beacons . . . . .	133	Anakao, Banc Ouest d' . . . . .	229
Amorona, Cap . . . . .	285	Anakao, Pointe d' . . . . .	255
Ampajony bluff . . . . .	209	Anakao shoal, East . . . . .	229

	Page		Page
Anakao shoal, West . . . . .	229	Andranoména . . . . .	207
Analalava . . . . .	196, 200	Andranomena, Pointe . . . . .	193
Anchorage . . . . .	199	Andranomody, Cap . . . . .	261, 263, 264
Aspect . . . . .	193-194, 196	Light . . . . .	263
Beacons . . . . .	196, 199	Signal station . . . . .	262
Currents . . . . .	199	Radio station . . . . .	262
Landmarks . . . . .	200	Andranopasy . . . . .	239
Lights . . . . .	196, 199	Anchorage, directions . . . . .	239
Port facilities . . . . .	200	Andraombé . . . . .	261
Signal station . . . . .	200	Andravina, Baie d' . . . . .	274
Storm signals . . . . .	200	Andravina river . . . . .	274
Analalava, Pointe . . . . .	190	André, Cap, light . . . . .	260
Anamakia, Plaine d' . . . . .	267	Andrema, Ilot . . . . .	132
Anambo, Nosy . . . . .	150	Andriamanoa, Cap . . . . .	254
Ananalava . . . . .	307	Andriamanoa, Mouillage d' . . . . .	256
Andamotibe . . . . .	244	Anchorage . . . . .	256-257
Andamoty, Pointe . . . . .	166	Andriambé, Pointe . . . . .	236
Andampy . . . . .	176	Andriamitaroka, Nosy . . . . .	238
Andantsara, Nosy . . . . .	152	Anchorage, directions . . . . .	238-239
Andassy-Bé . . . . .	183, 184	Tidal streams . . . . .	238
Andassy-Bé, Baie d' . . . . .	183	Andriangory, Nosy . . . . .	237-238, 238
Anchorage . . . . .	184	Anchorage, directions . . . . .	238
Andavaka, Cap . . . . .	326	Andrianmitarika, Nosi . . . . .	238
Andavaloaka . . . . .	244	Andriva Rangotro . . . . .	160
Andavaloaka, Pointe . . . . .	244	Androfiabé, Baie d' . . . . .	183
Andefitra, Pointe . . . . .	239, 240	Anchorage . . . . .	184
Andemba river, South . . . . .	228	Androka, Mouillage d' . . . . .	256
Andemba Sud, Rivière d' . . . . .	228-229	Anchorage . . . . .	257
Andembodemboka . . . . .	246	Andromache shoal . . . . .	64
Andemby, Pointe d' . . . . .	180	Andronjana Sud, beacons . . . . .	196
Andevorante . . . . .	307	Androtra, Nosy . . . . .	226, 227
Andiako, Pointe . . . . .	163, 167	Angadoka, Pointe d' . . . . .	184
Anchorage . . . . .	167	Angaziga . . . . .	116
Andilah, Banc d' . . . . .	174	Angèle, Pointe, buoy . . . . .	250
Andilah, Mont . . . . .	172	Anglaise, Ile . . . . .	108
Andilah, Pointe d' . . . . .	172, 174	Angoaka . . . . .	208
Andjamen . . . . .	266	Angoba . . . . .	236
Andohabe, Lac d' . . . . .	278	Angongo, Banc d' . . . . .	262
Andohatanga . . . . .	247	Angongo, Nosy . . . . .	262
Andohazampo, Anse . . . . .	265	Angontsy . . . . .	281
Andolopanahi shoal . . . . .	229	Light . . . . .	281-282
Andolopahanay, Banc d' . . . . .	229	Angontsy, Nosy . . . . .	281
Andovo Honkou . . . . .	161	Angontsy, Pitons d' . . . . .	281
Andovo Honkou, Baie . . . . .	161	Angontsy, Rade d' . . . . .	281, 282
Anchorage . . . . .	162	Anchorage . . . . .	282
Andrahibo, Pointe . . . . .	186, 187	Anihina, Nosy . . . . .	322
Andrahomanana, Crique d' . . . . .	326-327	Anjahanambo, Rivière . . . . .	287
Anchorage . . . . .	328	Anjanozano, Pointe d' . . . . .	181
Andrahomanana, Mont . . . . .	326	Anjombavola, Nosy . . . . .	152
Andrahombava, Nosy . . . . .	245	Anjouan, Ile . . . . .	116, 124-128
Anchorage, directions . . . . .	245-246	Aspect . . . . .	124
Andrahompotsy, Pointe . . . . .	265	Currents . . . . .	17
Andrakaka, Presqu' ile d' . . . . .	268	Eastern side . . . . .	127-128
Andramahiba bay . . . . .	149	anchorage . . . . .	128
Andramaimba, Baie . . . . .	149	beacons . . . . .	128
Andramaimbo mountain . . . . .	145, 153, 262	light . . . . .	128
Andramaimbo village . . . . .	157, 158	Northern side . . . . .	124-126
Andramona, Nosy . . . . .	240	anchorage . . . . .	126
Andranamby . . . . .	318	beacons, lights . . . . .	125
Andrangahazana . . . . .	295	storm signals . . . . .	126
Andranizany, Pointe d' . . . . .	175	South-western side . . . . .	126-127
Andrano, Nosy . . . . .	226, 227	anchorage . . . . .	127
Andrano Miserano . . . . .	187	beacons . . . . .	127
Andranoamby, Baie . . . . .	164	Anjouan, Pic d' . . . . .	124
Andranobé, Baie . . . . .	193	Ank-horraka . . . . .	294
Andranogoaka, Pointe . . . . .	175	Ankalafa . . . . .	201
Andranolava, Passe d' . . . . .	205	Ankarafotsy . . . . .	284
Andranolava, Rivière . . . . .	208, 209	Ankarafotsy, Rivière . . . . .	284
Andranomanilika . . . . .	188	Anchorage . . . . .	285



	Page		Page
Ankarakatova . . . . .	261	Antamanaka . . . . .	160
Ankaramay shoal . . . . .	234	Antampolo . . . . .	187
Ankaramisampana . . . . .	146	Antamtamo, Récif d' . . . . .	178
Ankaramy . . . . .	192	Antanalovo, Nosy . . . . .	162
Ankarana, Cap . . . . .	236	Antanambalana, Rivière . . . . .	287
Ankarana, Mont . . . . .	167, 168	Antananarivo . . . . .	5
Ankarana plateau . . . . .	320	Antanandava, Pointe . . . . .	212
Ankarea . . . . .	167, 168	Antangena, Pointe . . . . .	187
Ankarea bank . . . . .	168	Antaniaomby . . . . .	178
Ankasoberavina island . . . . .	184	Antany Mora . . . . .	189
Ankatafa . . . . .	192	Antandro, Nosy . . . . .	270
Ankaxoberavina, Ile . . . . .	184-185	Antoanina . . . . .	192
Ankazohabo . . . . .	240	Antoha, Rivière . . . . .	167
Ankazomai mouth . . . . .	232	Antolo, Nosy . . . . .	164
Ankazomalemy, Baie . . . . .	166	Antolohizana . . . . .	164
Anchorage . . . . .	167	Antomboka . . . . .	261
Ankéríkika . . . . .	270	Antongil, Baie d' . . . . .	283, 283-288
Ankéríkika, Baie d' . . . . .	270	Anchorage . . . . .	284
Anketsabe . . . . .	178	Aspect . . . . .	283
Ankify . . . . .	180, 181	Current . . . . .	284
Anchorage . . . . .	181	Eastern side . . . . .	284-285
Ankify, Massif d' . . . . .	180, 181	anchorage, directions . . . . .	284-285
Ankilahoa, Pointe d' . . . . .	173	Head of bay . . . . .	286-288
Ankirakanga, Pointe . . . . .	193	anchorage, directions . . . . .	287-288
Ankitikona . . . . .	151	beacons . . . . .	286-287
Ankolabe bay . . . . .	294	light . . . . .	288
Ankomba, Nosy . . . . .	272	signal station . . . . .	288
Ankoraka . . . . .	294	Port facilities . . . . .	288
Ankorika, Mamelons d' . . . . .	263	Western side . . . . .	286-286
Ankorobé, Pointe . . . . .	196	anchorage, directions . . . . .	286
Ankorokorobé, Presqu'île . . . . .	265	Antorotoro . . . . .	179
Ankotaka, Mont . . . . .	172	Antranoamby . . . . .	206
Annanas bank . . . . .	359	Antraraka . . . . .	236
Anchorage . . . . .	361	Anchorage, tidal streams . . . . .	237
Anonibé . . . . .	281	Antsabé, Baie d' . . . . .	271
Anonibé river . . . . .	281	Antsahabé . . . . .	165
Anonyme, islet . . . . .	79	Antsahambingo, Roche . . . . .	212
Anoritabé, Presqu'île . . . . .	265	Antsahampana . . . . .	181
Anorombato, Pointe . . . . .	209, 210	Antsahampana, Rivière . . . . .	181
Abnormal magnetic variation . . . . .	212	Antsahapano, Mont . . . . .	271
Lights . . . . .	211	Antsakoa, Baie d' . . . . .	169
Anorontany, Cap . . . . .	277, 278	Antsamanara, Pointe . . . . .	196
Anorontsangana . . . . .	190	Antsanira . . . . .	222
Anchorage . . . . .	191	Antsantsa, Baie . . . . .	155
Anosy, Pointe . . . . .	247, 248-249	Antsatramahavelona, Sommet . . . . .	194
Light . . . . .	249	Antsatsaka point . . . . .	193
Anse, <i>see</i> proper name . . . . .		Antsatsiaka, Pointe . . . . .	193
Ansoha . . . . .	170	Antsavaky, Pointe . . . . .	231
Antafiabé . . . . .	166	Antseranamahefitra, Rivière . . . . .	240
Antahotsaniaomby, Pointe . . . . .	211	Antséranambé, Pointe, Baie de . . . . .	
Antaimpitily, Banc d' . . . . .	182	Loky . . . . .	272
Antaimpitily, Pointe d' . . . . .	182	Antséranambé, Pointe, Cap St. . . . .	
Antala, Banc d' . . . . .	270	Vincent . . . . .	244
Antalaha . . . . .	279, 281	Antseranandava, Nosy . . . . .	217
Antalaha, Massif d' . . . . .	278	Antseranandefitra, Rivière . . . . .	240
Antalaha, Pitons d' . . . . .	281	Antsimaloto, Baie . . . . .	164
Antalaha, Rade d' . . . . .	280-281	Antsira . . . . .	240
Anchorage . . . . .	280	Antsirabé . . . . .	6
Beacons . . . . .	280	Antsirabé, Cap . . . . .	324
Light . . . . .	280	Antsiraka, Pointe, Baie d' Amba- . . . . .	
Signal station . . . . .	281	vatoby . . . . .	183
Antalavia . . . . .	284	Antsiraka, Pointe, Baie d' Antongil . . . . .	287
Anchorage, directions . . . . .	285	Antsirana . . . . .	269
Antalavia, Rivière . . . . .	284	Anchorages . . . . .	268
Antaly, Baie d' . . . . .	260	Dock . . . . .	269
Antaly Bé, Nosy . . . . .	260	Lights . . . . .	267-268
Antaly Kély, Nosy . . . . .	260	Signals . . . . .	269
Antaly, Nosy, Baie Ampamonty . . . . .	165	Antsoha, Nosy, Les Quatre Frères . . . . .	170
Antaly, Nosy, Iles Mitsio . . . . .	170	Antsoha, Nosy, Pointe d' Angadoka . . . . .	186

	Page		Page
Antsoibery . . . . .	173	Barracouta rock . . . . .	80
Antsomotra, Pointe . . . . .	246	Barren islands . . . . .	226-228
Aombé, Ilot . . . . .	132	Anchorage . . . . .	228
Approaching squadrons or aircraft carriers . . . . .	29	Directions . . . . .	228
Arbre Mort, L' . . . . .	183	Tidal streams . . . . .	228
Aride island . . . . .	66	Barrow point . . . . .	254
Arsenal bay . . . . .	348	Barton pass . . . . .	113
Artémise, Pointe de l' . . . . .	273	Barton point . . . . .	111, 113
Assimpao . . . . .	126	Aspect . . . . .	112
Assumption island . . . . .	92-93	Bassas da India . . . . .	142-143
Anchorage, beacons . . . . .	93	Basse, Pointe . . . . .	154, 157, 158
Tidal streams . . . . .	93	Bassin lake, Grande . . . . .	344
Astove island . . . . .	95-96	Bateau, Rochers . . . . .	120
Anchorage . . . . .	96	Bateau rock . . . . .	169
Aspect . . . . .	95	Bateaux, Passe aux . . . . .	131
Atafa, Nosy . . . . .	289	Directions . . . . .	131
Atsingo, Rivière . . . . .	201	Baty house . . . . .	71
Autserandava islet . . . . .	217	Bawden shoal . . . . .	237
Ave Maria rock . . . . .	67	Baxos da India . . . . .	143
Avirons, Ravine des . . . . .	340	Bayfield sand . . . . .	226
Anchorage . . . . .	341	Bazacar, Anse . . . . .	73
Avocare islet . . . . .	330	Beacon islet . . . . .	74-75
		Bé, Nosy, Baie de Mitehina . . . . .	238
		Bé, Nosy, Baie de Sainte-Luce . . . . .	322
		Bé, Nosy, Morombé, beacon . . . . .	241
		Befotaka . . . . .	160
		Befotaka, Baie de, Baie Andra- mimba 149, 159, 159-161	
Babet, Ile. . . . .	322, 323	Anchorage, directions . . . . .	160-161
Bagdad shoal . . . . .	230	Aspect . . . . .	159-160
Baie, <i>see</i> proper name . . . . .		Befotaka, Baie de, Morombé . . . . .	241
Baie du Cap . . . . .	356	Befotaka, Baie de, Nossi-Bé . . . . .	173-174
Bajo de Vinès . . . . .	142	Anchorage . . . . .	174
Baldrisy, Cap, current . . . . .	283	Befotaka, Pointe . . . . .	249
Baleine, La . . . . .	294	Behangovo, Nosy . . . . .	170
Baleine, Roche . . . . .	170	Behara, Rivière . . . . .	220
Baleine rocks . . . . .	331	Behenjavilo mouth . . . . .	232
Baleiniers, Rocher des . . . . .	292	Behenjavilo village . . . . .	232
Ballon, Le . . . . .	148	Behentona, Iles. . . . .	283
Ballón Loza, beacon . . . . .	196	Bekotoko . . . . .	166
Baly . . . . .	218, 219	Bekotoko, Pointe . . . . .	166
Baly, Baie de . . . . .	217, 218-219	Bel-air, Pointe de, light . . . . .	342
Anchorage, directions . . . . .	219	Belle Ile river . . . . .	355
Aspect . . . . .	218	Belle Ombre, Mahé island . . . . .	71
Tidal streams . . . . .	218	Belle Ombre, Mauritius, beacon . . . . .	356
Bambao . . . . .	128	Bellone, Cap . . . . .	283
Bambo, Anse . . . . .	133	Bélo. . . . .	235
Bambo, Ilot . . . . .	134	Bélo, Nosy . . . . .	236
Bambo, Pointe . . . . .	133	Bélo, Rivière . . . . .	236
Bambo, Récif . . . . .	136	Belobaka . . . . .	220
Bambou peak . . . . .	358	Belobaka, Rivière . . . . .	220, 221
Bambou, Pointe du . . . . .	343	Belomotro, Nosy . . . . .	152
Bambou range . . . . .	358	Bemahia, Pointe . . . . .	260
Banc, Bancs, <i>see</i> proper name . . . . .		Bemarivo, Rivière . . . . .	278
Bandaboa, Pointe . . . . .	132	Bemoka, Nosy . . . . .	244
Bandéli, Anse . . . . .	133	Bemoka, Pointe . . . . .	166
Bandéli, Ilot . . . . .	134, 136	Bénard, Grand . . . . .	332
Bandéli, Passe . . . . .	136	Bénard, Petit . . . . .	332
Bandéli, Récif . . . . .	136	Benares shoal . . . . .	107
Bangua . . . . .	117	Benjamin islet . . . . .	84
Barachois . . . . .	335	Benjana . . . . .	284
Baramahamay, Rivière . . . . .	187	Bepoaka, Cap . . . . .	223
Anchorage . . . . .	188	Berahodo . . . . .	187
Barbe, Grande . . . . .	70	Berambo, Pointe de . . . . .	175
Barker bank . . . . .	219	Berangomaina, Pointe . . . . .	191
Barkly islet . . . . .	349	Beravina . . . . .	223
Barkly point . . . . .	350	Bernard, Cap . . . . .	335
Barn Hill point . . . . .	249	Beroja, Nosy . . . . .	194
Baron, Pointe . . . . .	158, 159	Berondra, Rivière . . . . .	191
Barracouta islet . . . . .	273		
Light . . . . .	273		

	Page		Page
Berry, Pointe . . . . .	274	Boina, Baie— <i>contd.</i>	
Bertaut reef . . . . .	85	Anchorage, directions . . . . .	217
Besok, Rivière . . . . .	271	Boinaomary, Pointe . . . . .	210
Betaitra . . . . .	267	Bombétoke, Baie de . . . . .	209-215
Betaitra, Rivière . . . . .	267	Abnormal magnetic variation . . . . .	212
Betalinjona, Nosy . . . . .	170	Anchorage . . . . .	214
Betamenaka, Pointe . . . . .	170	Aspect . . . . .	209-210
Betanazo, Nosy . . . . .	170	Directions . . . . .	213-214
Betanta, Port de . . . . .	327	Landmarks . . . . .	209-210
Betsiboka, Rivière . . . . .	209, 215	Lights . . . . .	211
Betsioka mouth . . . . .	232	Pilotage . . . . .	211
Betsizaraina, Fort de . . . . .	312	Port facilities . . . . .	215
Betsizaraina, La Selle de . . . . .	310	Radio station . . . . .	215
Betsizaraina Saddle . . . . .	310	Tidal streams . . . . .	211, 214
Bevaoko, Récif . . . . .	169-170	Bonne-Espérance, Pointe de . . . . .	343
Bevato, Cap . . . . .	244	Bonne Tenue, Anse de . . . . .	278
Bevato, Nosy . . . . .	244	Booby islet, Rodriguez . . . . .	364
Bevilana . . . . .	221	Booby islet, Seychelles . . . . .	67
Bevoay, Banc . . . . .	231	Borneo reef . . . . .	140
Bewsher point . . . . .	354	Borona, Nosy . . . . .	256
Beza, Nosy . . . . .	210, 212	Bosse, La . . . . .	271
Light . . . . .	211	Bosy . . . . .	232
Bezezika, Pointe . . . . .	212	Boteler river . . . . .	217
Beacons . . . . .	212-213, 214	Boteler, Sommet . . . . .	218
Bigeault, Pointe . . . . .	270	Boudeuse cay . . . . .	82, 86
Bijoutier island . . . . .	88	Bouni, Ilot . . . . .	130
Bikaoky, Rivière . . . . .	220	Bourbier, Pointe du . . . . .	343
Biladi beacon . . . . .	118	Boursaint, Banc du, Baie de	
Binao, Roche . . . . .	171	Mitehina . . . . .	238
Bird island . . . . .	63, 65-66	Boursaint, Banc du, Barrier islands	227
Anchorage, directions . . . . .	66	Boursaint, Banc du, Passe de	
Bird islet . . . . .	357	Namakia . . . . .	204
Bisson . . . . .	140	Boursaint rock . . . . .	234
Bitte, La . . . . .	298	Bouzi . . . . .	134
Bivouac, Anse du . . . . .	265	Brabant, Cape . . . . .	344, 355
Anchorage . . . . .	266	Tidal streams . . . . .	355-356
Black islets . . . . .	276	Bras de mer des Citronniers inlet	356
Black river . . . . .	355	Bras de mer St. Martin inlet . . . . .	356
Black River bay . . . . .	355	Bretagne, Pointe de . . . . .	340
Anchorage . . . . .	356	Brickaville . . . . .	6
Black River bay, Little . . . . .	355	Brisans rocks . . . . .	69-70
Black River district . . . . .	7	Brisant point . . . . .	360
Black rock . . . . .	316	Brisants, Ilot des . . . . .	272
Blacksmiths rocks, The . . . . .	346	Brother, Middle . . . . .	109
Blague bay, La . . . . .	67	Brother, North . . . . .	109
Blanc, Morne . . . . .	71	Brother, South . . . . .	109
Blanc, Rocher . . . . .	123	Bufs reef . . . . .	358, 359
Blanche, Ilot . . . . .	132	Buni islet . . . . .	130
Blanchie, Roche . . . . .	133	Butor, Rivière Le . . . . .	342
Blanchisseuse rocks . . . . .	69	Butte aux Papayers hill . . . . .	348
Blenheim reef, anchorage . . . . .	105	Buzi . . . . .	134
Blévec, Pointe . . . . .	293, 294		
Blinder reef, The . . . . .	345		
Blyth's store . . . . .	350		
Boa Sadia, Banc . . . . .	130	Cacazou . . . . .	133
Boat passage . . . . .	131	Cacoxou, Ilot . . . . .	133-134
Bobaala . . . . .	259	Cafres, Plaine de . . . . .	332
Bobaombyvatobé . . . . .	265	Caille bank, La . . . . .	345
Bobatolana . . . . .	158	Cailloux Blancs, Baie des	261, 265-266
Boddam, Ile . . . . .	105	Anchorage . . . . .	266
Anchorage . . . . .	106	Aspect . . . . .	265
Boëni, Baie de . . . . .	130	Caiman rock . . . . .	79
Anchorage . . . . .	131	Camp d'Ankorika . . . . .	266
Boëni, Passe . . . . .	131	Campagnie hill . . . . .	183
Directions . . . . .	131	Canal, <i>see</i> proper name	
Boëni, Pointe . . . . .	130	Canl, Mont . . . . .	130
Boileau, Anse . . . . .	73	Canl, Pointe . . . . .	130
Boileau bay . . . . .	72, 73	Canonnier point . . . . .	346, 347, 348
Boina, Baie . . . . .	215, 216	Tidal streams . . . . .	346

	Page		Page
Canzuni, Ile . . . . .	122	Chien islet . . . . .	84
Anchorage . . . . .	122	Chien, Le . . . . .	158
Cap, Baie du . . . . .	356	Chimney rocks . . . . .	80
Cap, Faux . . . . .	327	Chinguné . . . . .	129
Cap, <i>see</i> proper name . . . . .		Choa, Anse, light . . . . .	133
Capricorne, Banc du . . . . .	296	Choa, Pointe . . . . .	133
Capricorne, Passe du . . . . .	153	Choazil, Iles . . . . .	130
Directions . . . . .	154	Choiseul, Port . . . . .	284
Capucin point . . . . .	71, 73	Choumare, Roche . . . . .	323
Light . . . . .	73	Chron, Pointe . . . . .	272
Carbonnier beacon . . . . .	319	Chumadini island . . . . .	122
Cargados Carajos shoals . . . . .	329-332	Cimandef, Pic . . . . .	332
Anchorage . . . . .	331-332	Cinq Mètres, Banc de . . . . .	173
Current . . . . .	331, 332	Citadel, The . . . . .	349
Directions . . . . .	331	Citronniers, Passe des . . . . .	362
Tidal streams . . . . .	331	Coal islet . . . . .	78
Caron, Port . . . . .	343	Coco island . . . . .	330
Caroni, Ile . . . . .	131	Anchorage . . . . .	331-332
Carpenters rocks, The . . . . .	346	Tidal streams . . . . .	331
Carré, Mont . . . . .	261	Cocoa islet . . . . .	364
Cascade bay . . . . .	79	Cocoanut islet . . . . .	92
Cascades, Anse des . . . . .	343	Cocoanut point . . . . .	291
Cascassaye islet . . . . .	84	Cocotiers, Pointe des, tidal streams . . . . .	291
Cassis church . . . . .	349	Coetivy island . . . . .	88-89
Castle peak, Mahé island . . . . .	71	Anchorage . . . . .	89
Castle peak, Silhouette island . . . . .	70	Coin . . . . .	159
Castor bank . . . . .	162-163	Coin du Mire . . . . .	106
Castor shoal . . . . .	168	Coin, Ile du . . . . .	106, 107
Cat and Kitten peak . . . . .	358	Anchorage, tidal streams . . . . .	107
Cater beacon . . . . .	113	Col du Courrier . . . . .	157
Catherine islet . . . . .	364	Colline, <i>see</i> proper name . . . . .	
Cauvin bank . . . . .	110	Combani . . . . .	129
Cavalier bank . . . . .	212	Communications . . . . .	25
Caves point . . . . .	346	Comore, Ile Grande . . . . .	116, 116-120
Lights . . . . .	354	Aspect . . . . .	116
Cédre point . . . . .	74	Current . . . . .	17
Centurion bank . . . . .	110	Eastern coast . . . . .	119-120
Cerf island, Port Victoria . . . . .	75	Northern coast . . . . .	116-117
Cerf island, Providence island . . . . .	97	South-eastern coast, anchorage . . . . .	119
Anchorage . . . . .	97	South-western coast . . . . .	119
Aspect . . . . .	97	Western coast . . . . .	117-119
Tidal streams . . . . .	97	anchorages . . . . .	117, 118
Cerf passage . . . . .	75, 76	Comores, Iles . . . . .	116-138
Beacon . . . . .	76	Currents . . . . .	17
Chagos archipelago . . . . .	104-115	Weather . . . . .	47
Currents, tidal streams . . . . .	104-105	Comoro islands . . . . .	116
Weather . . . . .	46-47	Compagnie, Sommet de la . . . . .	183
Chagos bank, Great . . . . .	108, 108-110	Conception island . . . . .	72
Anchorage . . . . .	109, 110	Condé, Banc du . . . . .	237
Current . . . . .	12, 14, 104	Cone d'Ambafaho . . . . .	175
Directions . . . . .	108	Cône, Sommet . . . . .	202
Chaloupe, Grande, Ravine . . . . .	334, 336	Confluent, Roche du . . . . .	183
Chaloupe, Récif . . . . .	135	Congo, Pointe . . . . .	132
Channel bank . . . . .	197	Conquest patch . . . . .	64
Charlot, Mount, light . . . . .	365	Constant bank, Le . . . . .	81
Chartres, Ile de . . . . .	322	Consular stations . . . . .	21
Chaussée des Otaries . . . . .	368	Cooper island . . . . .	349
Chauve Souris islet, Cosmoledo . . . . .		Coq, Le . . . . .	146
group . . . . .	94	Corail, Anse . . . . .	73
Chauve Souris islet, Curieuse bay . . . . .	68	Corail, Pointe . . . . .	272
Chauve Souris rock . . . . .	73	Corail, Pointe du . . . . .	267
Chauves-Souris, Pointe des . . . . .	268	Coral islands and reefs . . . . .	1-2
Chaux river . . . . .	362	Navigation amongst . . . . .	2
Chenal, <i>see</i> proper name . . . . .		Coral point . . . . .	364
Chesterfield islet . . . . .	224	Cordelière, Banc . . . . .	233
Anchorage . . . . .	225	Cordelière, Banc de la . . . . .	163
Chèvres, Ile aux . . . . .	322	Cornard, Pointe . . . . .	270
Chezani beacon, light . . . . .	118	Corne point . . . . .	365
Chiconi . . . . .	120	Corps de Garde . . . . .	344

	Page		Page
Cosmoledo group . . . . .	93-95	Denis island . . . . .	66
Anchorages . . . . .	95	Anchorage . . . . .	66
Tidal streams . . . . .	95	Light . . . . .	66
Courrier, Baie du . . . . .	157-158	Dent, La . . . . .	321
Anchorages . . . . .	157, 158	Dénudé, Pic . . . . .	184
Aspect . . . . .	157	Déposés, Ile des . . . . .	99
Directions . . . . .	157	Dépouillé, Sommet . . . . .	159-160
Courrier, Ilot du . . . . .	157	Depressions . . . . .	32-36
Cousin, North . . . . .	69	Deratisation . . . . .	21
Cousin, Roche de . . . . .	342	Desroches, Ile . . . . .	86-87
Cousin, South . . . . .	69	Anchorage . . . . .	87
Crab islet . . . . .	364	Current . . . . .	86
Crabe, Le . . . . .	172	Directions . . . . .	87
Cratère, Anse du . . . . .	176	Tidal streams . . . . .	87
Anchorage . . . . .	176	Deumoni . . . . .	128
Cratère, Pointe du . . . . .	174, 176	Deux Soeurs, Les . . . . .	179, 181
Crescent reef . . . . .	227	Devil's point . . . . .	358
Crique, <i>see</i> proper name . . . . .		Diable, Cap du . . . . .	274
Cristaux, Les . . . . .	153	Diable, Le . . . . .	151, 159
Cruizer, Port . . . . .	256	Diamant, Ile . . . . .	106, 107
Anchorage . . . . .	257	Anchorage . . . . .	107
Cul-de-Sac Gallois . . . . .	267	Diamant reef . . . . .	360, 361
Anchorage . . . . .	268	Diamond bank . . . . .	203
Curieuse bay . . . . .	68	Diamond islet . . . . .	364
Anchorage, directions . . . . .	68	Diégo . . . . .	267
Curieuse island . . . . .	67, 68	Diégo, Cap . . . . .	267
Currents . . . . .	9-19	Diego Garcia . . . . .	111-115
Agulhas current . . . . .	9, 11	Anchorages . . . . .	114-115
Effect of tropical revolving storm on . . . . .	19	Aspect . . . . .	111-112
Equatorial counter-current . . . . .	12-14	Beacons . . . . .	113
Equatorial current . . . . .	14-16, 17	Directions . . . . .	114
Mozambique current . . . . .	16-18	Meteorological tables . . . . .	55
South-east trade drift . . . . .	19	Tidal streams . . . . .	112
Southern Ocean current . . . . .	18	Diégo, Ile . . . . .	260
Cyclones, tropical . . . . .	41-44	Diego Rais island . . . . .	363
		Diégo-Suarez, Baie de . . . . .	261-269
		Anchorages . . . . .	266, 267, 268
D'Abord, Rivière . . . . .	341	Aspect . . . . .	261-262
D'Arros islet . . . . .	82, 84-85	Beacons . . . . .	263
Anchorage . . . . .	85	Directions . . . . .	263-265
Tidal streams . . . . .	82, 84	Dock . . . . .	269
D'Esny point . . . . .	357	Landmarks . . . . .	261-262
D'Estaing shoal . . . . .	233	Lights . . . . .	263, 267
D'Oscorne, Passe . . . . .	362	Pilots . . . . .	262
Dalrymple rock . . . . .	184	Port facilities . . . . .	269
Danger island, anchorage . . . . .	109	Radio station . . . . .	269
Danger shoals . . . . .	107	Signal stations . . . . .	262, 269
Danish entrance . . . . .	357, 359-360	Tidal streams . . . . .	262, 267
Dapani, Pointe . . . . .	130	Digue island, La . . . . .	63, 68
Daphne rock . . . . .	171	Distress signals, aircraft . . . . .	26
Dart rocks . . . . .	224	Dives bank . . . . .	167-168
Dauphin, Fort . . . . .	6, 324-326	Djiamanguira . . . . .	159
Anchorage . . . . .	325	Djumadjini, Ile . . . . .	122
Aspect . . . . .	324-325	Anchorage . . . . .	122
Beacons . . . . .	325	Dombala, Nosy . . . . .	308
Current . . . . .	325	Anchorage . . . . .	308
Directions . . . . .	325-326	Domoni . . . . .	120
Light . . . . .	325	Anchorage . . . . .	120
Port facilities . . . . .	326	Dondosy, Nosy . . . . .	226, 227
Signal station . . . . .	326	Dos de Baleine . . . . .	245
Dauphine, Anse . . . . .	324, 325	Douane, Pointe de la . . . . .	296
De Cinq Mètres, Banc . . . . .	173	Beacon, light . . . . .	297
De Mahazandry, Baie . . . . .	175	Double, Récif . . . . .	154
De Mahazandry village . . . . .	175	Double, Rocher . . . . .	316
Demoka . . . . .	6	Doueni cove . . . . .	123
Demoka Mati . . . . .	231	Douény, Anse . . . . .	123
Demoka, Rivière . . . . .	231	Doumoueli, Pointe . . . . .	130
		Dover Castle . . . . .	146
		Dragon river . . . . .	355

	Page		Page
Duamuniu, Cap. . . . .	129, 132	Etoile, Anse . . . . .	74
Dundas islet . . . . .	261	Etoile, Banc de l' . . . . .	258
Dune, Baie de la . . . . .	260	Anchorage . . . . .	258
Dunes Mamelles . . . . .	220	Etoile cay . . . . .	82, 86
Dupont shoal . . . . .	64	Etoile, Récifs de l' . . . . .	258
Dupuis, Mont . . . . .	186	Etuis, Banc des . . . . .	171
Dzamandzar, Banc de . . . . .	174	Euphrates islet . . . . .	92
Dzaoudzi . . . . .	138	Europa, Ile . . . . .	143-144
Storm signals . . . . .	138	Anchorage . . . . .	144
Dzaoudzi, Ilot . . . . .	134	Aspect . . . . .	143
Anchorage . . . . .	137	Currents . . . . .	17-18, 144
Light . . . . .	137-138	Europa rocks . . . . .	142-143
Radio station . . . . .	138	Euryalus bank . . . . .	209
Dzugoma, Ilot, beacon . . . . .	132	Evatra, Monts . . . . .	323
Eagle islands, anchorage . . . . .	109	Faget beacons . . . . .	125
Eagle islet . . . . .	82, 83-84	Faho, Nosy . . . . .	307
Anchorage . . . . .	84	False Loza peak . . . . .	196
Tidal streams . . . . .	82	False pass . . . . .	270
East Anakao shoal . . . . .	229	False passage . . . . .	136
East, Cape . . . . .	259	False Table . . . . .	202
East channel . . . . .	91-92	Faly, Nosy . . . . .	171
East islet, Baie d'Ampasilava . . . . .	239	Famaho, Nosy . . . . .	154-155
East islet, Diego Garcia . . . . .	111, 112, 114	Fanambana . . . . .	277
East Lango bank . . . . .	196	Fanambana, Rivière . . . . .	278
East North islet . . . . .	94	Fanandomotra, Passe . . . . .	248
East pass, Great . . . . .	304	Tidal streams . . . . .	248
East point . . . . .	111	Fanantara, Rivière . . . . .	312-313
Anchorage . . . . .	115	Fandrazazana anchorage . . . . .	295
Aspect . . . . .	112	Fandrazazana, Rivière . . . . .	289, 295
East reef . . . . .	153	Anchorage . . . . .	295
East Sister . . . . .	69	Fanemotra, Baie de . . . . .	244, 246
Eastern pass . . . . .	365	Anchorage, directions . . . . .	246
Directions . . . . .	366	Fangoro . . . . .	240
Eclipse bay . . . . .	113	Fanihi, Nosy . . . . .	173
Anchorage . . . . .	114	Faninana . . . . .	164
Eclipse point . . . . .	111, 115	Fano, Nosy . . . . .	265
Aspect . . . . .	112	Fanu, Nosi . . . . .	265
Effatsy, Nosy . . . . .	132	Faohina, Nosy . . . . .	197
Effect of tropical revolving storm . . . . .		Faon islet . . . . .	75
on the current . . . . .	19	Farafakabé, Anse . . . . .	265
Egmont islands . . . . .	109	Anchorage . . . . .	266
Egyptien, Mont. . . . .	271	Farafangana . . . . .	317, 318-320
Elder rock . . . . .	113	Abnormal magnetic variation . . . . .	319
Emile-Héloïse, Banc de l' . . . . .	225	Anchorage . . . . .	319
Emokala . . . . .	315	Beacons . . . . .	318-319
Light . . . . .	316	Current . . . . .	318
Entrance shoal . . . . .	154	Directions . . . . .	319
Entrecastreaux, Pointe d' . . . . .	368	Landmarks . . . . .	318
Entrée, Banc de l' . . . . .	154	Lights . . . . .	318-319
Entrée, Grand Banc de l' . . . . .	172-173	Meteorological tables . . . . .	59
Epave, Rocher . . . . .	139	Port facilities . . . . .	320
Equatorial counter-current . . . . .	12-14	Signal station . . . . .	320
Equatorial current . . . . .	9, 10, 14-16, 17	Faraony, Rivière, anchorage . . . . .	315
Erdwin, Banc . . . . .	173	Fararano . . . . .	160
Est, Cap . . . . .	281	Farquhar islands . . . . .	98, 98-100
Current . . . . .	281	Anchorage . . . . .	99-100
Est d'Anakao, Banc . . . . .	229	Directions . . . . .	100
Est de Lango, Banc . . . . .	196-197	Tidal streams . . . . .	100
Beacon . . . . .	196	Weather . . . . .	45-46
Est, Ile de l' . . . . .	239	Fascène . . . . .	175
Est, Pointe . . . . .	131	Fascène, Baie de . . . . .	175
Est, Récif . . . . .	153	Anchorage . . . . .	176
Estaing, Banc du d' . . . . .	225	Fasy, Nosy, Baie Andramaimba . . . . .	150
Etang, Pointe de l' . . . . .	342	Fasy, Nosy, Cap St. Vincent . . . . .	245
Étang Salé . . . . .	340	Fathom bank, Three . . . . .	302
Étang Salé, Pointe de l' . . . . .	340	Faty, Nosy . . . . .	150

	Page		Page
Fausse Baie des Galions . . . . .	325, 326	Francais, Baie des . . . . .	261, 266-267
Fausse passe, Baie de Ranobé . . . . .	248	Anchorage . . . . .	270
Fausse passe, Baie de Rigny . . . . .	270	Francais, Montagne des . . . . .	267
Fausse passe, Ile Mayotte . . . . .	136	Francaise, Baie . . . . .	271
Fausse Table, Baie de Mahajamba . . . . .	202	Francis bay . . . . .	101
Fausse Table, Massif d'Antalaha . . . . .	278	French submarine signals . . . . .	28
Fausse Mamelles . . . . .	300	Frères, Banc des . . . . .	170
Faux Ballon . . . . .	196	Frères, Trois . . . . .	274
Faux Cap . . . . .	327	Friends creek . . . . .	267
Faux port . . . . .	272	Frigate island, Cargados Carajos shoals . . . . .	331
Félicité island . . . . .	68	Frigate island, Seychelles . . . . .	80
Fénérive . . . . .	296-298	Anchorage . . . . .	80-81
Anchorage . . . . .	298	Frigate islet . . . . .	364
Beacons . . . . .	297	Fry shoal . . . . .	296
Directions . . . . .	297-298	Fuel . . . . .	22
Lights . . . . .	297		
Port facilities . . . . .	298		
Fenoarivo . . . . .	321	Gabriel islet . . . . .	345, 347
Fer-à-Cheval, Baie, anchorage . . . . .	361	Gabrielle shoal . . . . .	314
Ferme, La . . . . .	363	Gales . . . . .	40
Fianarantsoa . . . . .	6	Galets, Pointe des, light . . . . .	336
Fièvre, Pointe à la . . . . .	176	Galets, Port des . . . . .	333, 337-339
Fihérénana, Rivière . . . . .	247, 248	Anchorage . . . . .	338
Firing danger areas . . . . .	21-22	Beacons . . . . .	337-338
Fisaka, Nosy, Cap St. Sébastien . . . . .	162	Current . . . . .	337
Fisaka, Nosy, Iles Mitsio . . . . .	168	Depths . . . . .	337
Flacourt beacon . . . . .	325	Directions . . . . .	338
Flacq district . . . . .	7	Lights . . . . .	337
Flacq passe . . . . .	362	Pilotage . . . . .	337
Flamand islet . . . . .	357	Port facilities . . . . .	339
Flamand point . . . . .	359-360	Signal station . . . . .	338, 339
Flat islet, Mauritius . . . . .	345	Galets river . . . . .	365
Anchorage . . . . .	347	Galets, Rivière des . . . . .	333
Light . . . . .	345	Galions, Fausse Baie des . . . . .	325, 326
Flat islet, Rodriguez . . . . .	367	Gallois, Cul-de-Sac . . . . .	267
Flat rocks . . . . .	120	Anchorage . . . . .	268
Flying Fish bank . . . . .	224	Ganges bank . . . . .	110
Flying Fish shoal . . . . .	224	Garland rock . . . . .	322
Fola, Rivière . . . . .	220	Gégé beacon . . . . .	128
Fomboni, Ile Grande Comore . . . . .	120	George, Fort . . . . .	349
Fomboni, Ile Mohéli . . . . .	122, 123	Gerezani beacon . . . . .	117-118
Anchorage, directions . . . . .	124	Light . . . . .	118
Beacons . . . . .	124	Geyser reef . . . . .	139-140
Signal station, storm signals . . . . .	123	Currents . . . . .	140
Fomboni, Mouillage de . . . . .	123-124	Gilberte shoal . . . . .	65
Anchorage, directions . . . . .	124	Glace, Port . . . . .	72
Beacons . . . . .	124	Glaud, Port . . . . .	72
Signal station . . . . .	123	Glorieuse, Ile . . . . .	138, 139
Fonga, Nosy . . . . .	308	Anchorage . . . . .	139
Fontaine, Mouillage de la . . . . .	126	Tidal streams . . . . .	139
Forban, Anse . . . . .	80	Glorieuses, Iles . . . . .	138-139
Forbans, Ilot aux . . . . .	292	Anchorage . . . . .	139
Forfait, Banc du . . . . .	205	Aspect . . . . .	138-139
Foro, Ile . . . . .	121	Currents . . . . .	139
Fort Dauphin, <i>see</i> Dauphin, Fort . . . . .	324	Tidal streams . . . . .	139
Fortune bank . . . . .	89	Glorioso islands . . . . .	138
Fosse, Récif de la . . . . .	153	Goelette islet, Cosmoledo group . . . . .	94
Foty, Nosy . . . . .	151	Gœlétte islet, Farquhar group . . . . .	99
Foulpointe . . . . .	298, 299-300	Goelettes, Passe des . . . . .	362
Anchorage . . . . .	299-300	Goliath, Banc du . . . . .	172
Aspect . . . . .	299	Golo, Passe du . . . . .	290
Current . . . . .	299	Gombrani islet . . . . .	367
Directions . . . . .	299	Gouffre, Pointe du . . . . .	336
Fouquet, Ile . . . . .	106	Gouffres, Cap des . . . . .	277
Anchorage, tidal streams . . . . .	107	Goulet, Ile du . . . . .	203
Fouquet islet, Amirante isles . . . . .	84	Grand Banc de l'Entrée . . . . .	172-173
Fouquet islet, Mauritius . . . . .	357	Grand Banc, Le . . . . .	262
Light . . . . .	358		
Fous islet . . . . .	357		

	Page		Page
Grand bay . . . . .	348	Halbrand, Point . . . . .	291
Grand Bénard . . . . .	332	Hao, Nosy, Baie Andramaimba . . . . .	149
Grand Paté . . . . .	358, 359	Hao, Nosy, Cap St. Vincent . . . . .	245
Grand Pays Brûlé . . . . .	343	Anchorage, directions . . . . .	245-246
Grand Port . . . . .	344, 357-362	Tidal streams . . . . .	245
Anchorage . . . . .	361	Hara, Nosy . . . . .	151-152, 152
Aspect . . . . .	358	Haramy, Nosy . . . . .	287
Beacons . . . . .	358	Harrison, Mount . . . . .	71
Depths . . . . .	357-358	Harrison rocks . . . . .	75
Directions . . . . .	360-361	Hastie, Môle . . . . .	305
Lights . . . . .	358	Hastie, Pointe . . . . .	300, 303
Port facilities . . . . .	362	Light . . . . .	303
Tidal streams . . . . .	358	Haziers, Pointe des . . . . .	342
Grand Port district . . . . .	7	Heji, Nosy . . . . .	170
Grand Port mountain . . . . .	358	Hellot canal . . . . .	6
Grand Récif, Baie Andramaimba . . . . .	152	Hellville . . . . .	172, 176, 180
Grand Récif du Nord-Est . . . . .	132	Signal station . . . . .	180
Grand récif, Le . . . . .	303	Hellville, Rade d' . . . . .	176-177
Grand Récif, Tuléar . . . . .	249	Anchorage . . . . .	179-180
Tidal streams . . . . .	251	Beacons . . . . .	177
Grand river . . . . .	344	Directions . . . . .	179
Grand River bay . . . . .	349	Light . . . . .	177
Grand River South-East . . . . .	362	Signal station . . . . .	180
Grand River South-East village . . . . .	362	Winds . . . . .	180
Grand Serpent, Le . . . . .	172	Héloïse, Banc de l' . . . . .	178
Grande Anse . . . . .	67	Hercules bay . . . . .	361, 361-362
Grande Barbe . . . . .	70	Anchorage . . . . .	361
Grande Bassin lake . . . . .	344	Hermes patch . . . . .	64-65
Grande Chaloupe, Ravine . . . . .	334, 336	Hermione point . . . . .	355
Grande Comore, Ile . . . . .	116, 116-120	Hermione spit . . . . .	355, 356
Aspect . . . . .	116	Hermitage islet . . . . .	367
Current . . . . .	17	Heron, Ilot . . . . .	272
Eastern coast . . . . .	119-120	Hiarambazaha, Pointe . . . . .	275
Northern coast . . . . .	116-117	Hodoul jetty . . . . .	77-78
South-eastern coast, anchorage . . . . .	119	Hodoul point . . . . .	91
South-western coast . . . . .	119	Hodoul rock . . . . .	74
Western coast . . . . .	117-119	Hôpital, Nouvel, Pointe du . . . . .	296
anchorage . . . . .	117, 118	Horse-shoe bight, anchorage . . . . .	361
Grande Ile bois mangue . . . . .	106	Hosken point . . . . .	368, 369
Grande Mamelle . . . . .	321	Anchorage . . . . .	368
Grande Passe, Baie de Mahajamba . . . . .	204	Houareau, Passe . . . . .	91
Grande Passe, Baie Maribé . . . . .	169	Houssaye, Cap de la . . . . .	339
Grande Passe de l'Est . . . . .	304	Houssaye, Pointe La . . . . .	339
Grande Passe de l'Ouest . . . . .	131	Howard, Mount . . . . .	70
Grande Passe, Pointe de la . . . . .	361	Huttres, Baie aux . . . . .	366
Grande Passe, Rodriguez . . . . .	367	Huitres, Ile aux . . . . .	271
Grande Poste . . . . .	98	Hutchison point . . . . .	370
Grappin, Le . . . . .	260	Hydrographic information . . . . .	22
Great Chagos bank . . . . .	108, 108-110		
Anchorage . . . . .	109, 110		
Current . . . . .	104		
Directions . . . . .	108		
Great East pass . . . . .	304	Ianatsony . . . . .	253
Great North-East reef . . . . .	132	Iaroka, Rivière . . . . .	307
Great pass . . . . .	91	Ice . . . . .	20-21
Great reef, Baie Andramaimba . . . . .	152	Iconi . . . . .	118
Great Reef, Tuléar . . . . .	248	Iconi hill . . . . .	118
Great river . . . . .	281	Ifontsy . . . . .	300
Great Road . . . . .	176	Ifontsy, Banc d' . . . . .	302
Great South point . . . . .	360	Ifontsy, Rivière . . . . .	300
Green islet . . . . .	275	Ilainsambo, Nosy . . . . .	297
Grenouille, Banc de la . . . . .	220	Ilansambo, Nosi . . . . .	297
Guibert, Roche . . . . .	173	Ile de Sable, Récif de l' . . . . .	237
Gunners Quoin islet . . . . .	346	Ile Poule, Passe de l' . . . . .	108
Guy, Ilot . . . . .	273	Ile, <i>see</i> proper name . . . . .	
		Iles Choazil, Passe des, directions . . . . .	131
		Iles, Pointe aux . . . . .	274
		Iles, <i>see</i> proper name . . . . .	
		Ilot, <i>see</i> proper name . . . . .	
Habu, Ras . . . . .	116, 117	Imérina rock . . . . .	234
Haddon point . . . . .	70		



	Page		Page
Indian islet . . . . .	232	Kartala, Mont . . . . .	116
Indien, Ilot . . . . .	232	Kasenjy, Rivière . . . . .	220, 221
Intendance, Anse . . . . .	73	Katsépé, beacon . . . . .	210
Intermédiaire, Banc, Baie de Mahajamba . . . . .	206	Katsépé, Massif de Light . . . . .	209, 210
Intermédiaire, Banc, Cap St. Sébastien . . . . .	150	Katsépé, Passe de . . . . .	211
Intermédiaire, Récif . . . . .	316	Katsépé, Pointe . . . . .	209
Intermediate bank . . . . .	150	Kely, Nosy . . . . .	209, 210
Iramafi, River . . . . .	323	Kerindy, Rivière . . . . .	182
Iranja, Nosy, light . . . . .	188	Kerindy, Rivière . . . . .	232
Iris, Banc de l' . . . . .	130	Kiakala, Récif . . . . .	223
Ironono . . . . .	160	Kiboaboa, Rocher . . . . .	187
Ironono, Baie . . . . .	161	Kibuboa point . . . . .	187
Ironono, Mount . . . . .	159	Kilibé, Pointe . . . . .	249
Isandra, Rivière . . . . .	321	Kimby, Cap . . . . .	231-232
Isiritra, Rivière . . . . .	298	Kirindy, Rivière . . . . .	236
Itampolo, Anse . . . . .	256	Kirota, Banc . . . . .	171
Itapera, Pointe . . . . .	323	Kisimany, Nosy . . . . .	182
Itapère, Anse d' . . . . .	324	Kitombo . . . . .	240
Itapérina, Baie d' . . . . .	323	Kitombo, Rivière . . . . .	240
Itapérina peninsula . . . . .	322	Kivinjy, Nosy . . . . .	187
Itapérina, Pointe d' . . . . .	323, 324	Koalabé, Anse de . . . . .	294
Anchorage . . . . .	324	Koba, Nosy . . . . .	265
Light . . . . .	324	Komamery, Pointe . . . . .	188
Itapérina, Roche . . . . .	323-324	Komany cliffs . . . . .	205
Itsandha . . . . .	117	Komany, Pointe . . . . .	208
Itséré, Cap . . . . .	244	Komany, Rivière . . . . .	208
Ivatra hill . . . . .	323	Komatsana, Pointe . . . . .	201
Ivolina, River . . . . .	300	Komba, Nosy . . . . .	172, 178, 181
Ivoloina, Rivière . . . . .	300	Kongony, Rivière . . . . .	182-183
Ivondro, River . . . . .	306	Koraraika, Baie de . . . . .	223
Ivondrona . . . . .	307		
Ivondrona rivière . . . . .	306-307		
		L'Ablette . . . . .	148
Jacoleet point . . . . .	359	L'Arbre Mort . . . . .	183
Jacotet bay . . . . .	356	L'Ilot . . . . .	80
Jardins, Pointe des . . . . .	335	La Baleine . . . . .	294
Current . . . . .	336	La Bitte . . . . .	298
Jennifer shoal . . . . .	113	La Blague bay . . . . .	67
Jiamangiara . . . . .	159	La Bosse . . . . .	271
Jio Jio . . . . .	165	La Caille bank . . . . .	345
Johannes point . . . . .	94	La Dent . . . . .	321
Johnny channel . . . . .	91	La Digue island . . . . .	63, 68
Jonchée bar . . . . .	358	La Ferme . . . . .	363
Josy . . . . .	6	La Houssaye, Pointe . . . . .	339
Juan de Nova, Ile . . . . .	141-142	La Junon bank . . . . .	65
Anchorage, directions . . . . .	141	La Lanterne . . . . .	181
Beacon . . . . .	141	La Marianne rock . . . . .	342
Currents . . . . .	141	La Mouche, Anse . . . . .	73
Landmarks . . . . .	141	La Passe . . . . .	70
Jumeaux, Bancs . . . . .	135	La Perle reef . . . . .	81
Junon bank, La . . . . .	65	Anchorage . . . . .	81
		La Possession . . . . .	336
Kajohy, Nosy . . . . .	170	Anchorage . . . . .	337
Kakambana, Baie . . . . .	187	La Poule . . . . .	153, 259
Kakambana, Rivière . . . . .	187	La Queue de Lango . . . . .	197
Kalakajoro, Nosy . . . . .	189	La Rue, Point . . . . .	79
Kalomisampa . . . . .	161	La Selle de Betsizaraina . . . . .	310
Kandranikély mouth . . . . .	211	La Selle de Vatomandry . . . . .	307
Kandrany, Massif de . . . . .	210	La Selle, Iles Comores . . . . .	124
Kanzuni . . . . .	122	Anchorage . . . . .	126
Karabo, Nosy . . . . .	170	La Selle, Madagascar . . . . .	153, 157
Karimboly, Anse de . . . . .	327	La Tortue . . . . .	172
Karimboly, Cap des . . . . .	327	Lac, see proper name . . . . .	
		Lakandava, Nosy . . . . .	152
		Lakaria . . . . .	296-297
		Laliara, Nosy . . . . .	271
		Lamboharana . . . . .	246
		Lamboharana, Pointe . . . . .	244, 246

	Page		Page
Laminoir, Récif du . . . . .	134	Lights, Air . . . . .	26
Lampaolo, Rivière . . . . .	236	Limon, Mount . . . . .	363
Land and sea breezes . . . . .	40-41	Lion, Le . . . . .	152
Lango bank, East . . . . .	196	Lion's Head mountain . . . . .	358
Lango bank, North-West . . . . .	195	Lise, Ile du . . . . .	138
Lango bank, West . . . . .	195	Little Black River bay . . . . .	355
Lango, Nosy . . . . .	195, 196	Little Mapou bay, anchorage . . . . .	101
Lango Tail . . . . .	197	Little Pass banks . . . . .	155
Langor, Nosi . . . . .	263	Little reef . . . . .	302
Langoro, Nosy, light . . . . .	263	Lloyd's signal station . . . . .	28
Lanier pass . . . . .	91	Loapasana, Nosy . . . . .	265
Lanivato cliffs . . . . .	255-256	Loatrafasana, Nosi . . . . .	265
Lanivato, Roches de . . . . .	256	Local weather . . . . .	45-53
Lanterne, La . . . . .	181	Agalega islands . . . . .	45-46
Lapin, Ile . . . . .	99	Amirante isles . . . . .	45-46
Large, Récif du . . . . .	316	Chagos archipelago . . . . .	46-47
Large, Rochers du . . . . .	309	Comores, Iles . . . . .	47
Larras, Roche . . . . .	175	Farquhar group . . . . .	45-46
Larrée, Pointe à . . . . .	294	Madagascar . . . . .	48-51
Currents . . . . .	295	Mauritius . . . . .	51-52
Lascars point . . . . .	80	Mozambique channel . . . . .	47-48
Latazar, Passe . . . . .	362	Réunion . . . . .	51
Launay, Port . . . . .	72	Rodriguez island . . . . .	52-53
Lava, Nosy, Analalava . . . . .	194	Saint-Paul, Ile . . . . .	53
Light . . . . .	194	Seychelles . . . . .	45-46
Lava, Nosy, Barren islands . . . . .	226, 227	Lockwood reef . . . . .	227
Anchorage . . . . .	228	Lockyer, Mount . . . . .	71
Lava, Nosy, Diégo-Suarez . . . . .	260	Lohatrozana, Cap . . . . .	289
Lava, Nosy, Iles Mitsio . . . . .	163, 168	Lohotra river . . . . .	6
Lava, Nosy, Morombé . . . . .	241-242, 242	Lokintsy, Anse de . . . . .	291
Lavalohalika, Pointe . . . . .	190	Lokobé, Mont . . . . .	172
Lave, Pointe de . . . . .	117	Lokobé, Passe . . . . .	179
Laverdie point . . . . .	356, 357	Lokobé, Pointe . . . . .	176, 177
Lazare, Baie . . . . .	73	Beacons . . . . .	177
Lazare headland . . . . .	72, 73	Lokolo river . . . . .	6
Lazare, Point . . . . .	73	Loky . . . . .	272
Le Ballon . . . . .	148	Loky, Baie de . . . . .	272
Le Butor, Rivière . . . . .	342	Loky, Rivière de . . . . .	272
Le Chien . . . . .	158	Lolo, Nosy . . . . .	182
Le Constant bank . . . . .	81	Lomotro . . . . .	156
Le Coq . . . . .	146	Lomotro, Baie . . . . .	156-157
Le Crabe . . . . .	172	Long, Ilot . . . . .	260
Le Diable . . . . .	151	Long islet, beacon . . . . .	75
Le Grand Banc . . . . .	262	Longany, Nosy . . . . .	206
Le Grand récif . . . . .	303	Longogori, Passe . . . . .	136
Le Grand Serpent . . . . .	172	Longoni, Baie . . . . .	132
Le Grappin . . . . .	260	Anchorage . . . . .	132
Le Lion . . . . .	152	Longoni, Crique . . . . .	132
Le Mâtassé . . . . .	359	Longoni, Pointe . . . . .	132
Beacon . . . . .	358	Lorho, Banc . . . . .	225
Le Page beacon . . . . .	319	Lotsoina, Baie . . . . .	145, 147
Le Petit récif . . . . .	302, 304	Anchorages, directions . . . . .	148
Le Piton mountain . . . . .	366	Tidal streams . . . . .	148
Le Pouce, north-eastern coast of		Louaréa . . . . .	291
Madagascar . . . . .	261	Anchorage . . . . .	291
Le Pouce, south-eastern coast of		Louis, Port, <i>see</i> Port Louis . . . . .	348
Madagascar . . . . .	321	Lovobé . . . . .	234
Leconte point . . . . .	113	Anchorage . . . . .	235
Leja, Mont . . . . .	168	Lovobé, Rivière . . . . .	234
Les Cristaux . . . . .	153	Lovocampy valley . . . . .	253
Les Deux Soeurs . . . . .	179, 181	Lowry, Iles . . . . .	271-272
Les Mamelles . . . . .	154	Loza, Rivière . . . . .	193
Les Pleiades . . . . .	172	Directions . . . . .	200
Les Quatre Frères . . . . .	170	Light . . . . .	199
Les Roches Canales . . . . .	67	Tidal streams . . . . .	200
Leven bank . . . . .	162	Luala . . . . .	120
Leven, Port . . . . .	272	Luala islet . . . . .	120
Levique, Pointe . . . . .	269	Lubine, Ile . . . . .	110
Leviqui, Pointe . . . . .	269	Lynx reef . . . . .	221

	Page		Page
Lyra bank, Analalava . . . . .	194	Mahazandry, Baie de . . . . .	175
Lyra bank, Baie de Mahajamba . . . . .	206	Anchorage . . . . .	175
Lys, Ile du . . . . .	138-139	Mahazandry, De . . . . .	175
Anchorage . . . . .	139	Mahé island . . . . .	63, 70-80
Tidal streams . . . . .	139	Aspect . . . . .	70-71
		Currents . . . . .	63-64
		Eastern coast . . . . .	79-80
		Lights . . . . .	73, 74
		North-eastern coast . . . . .	74-79
		anchorage . . . . .	76
		beacons . . . . .	74, 79
		light . . . . .	74
		North-western coast . . . . .	71-72
		anchorage . . . . .	72
		South-western coast . . . . .	72-73
		anchorage . . . . .	72, 73
		light . . . . .	73
M'dé . . . . .	118	Mahebo, Rivière . . . . .	167
M'Sangani beacon . . . . .	128	Mahébourg . . . . .	357, 362
M'Zambourou, Ile . . . . .	130	Tidal streams . . . . .	358
Anchorage . . . . .	130-131	Mahéla . . . . .	313
M'Zambourou, Passe . . . . .	129, 135-136	Anchorage, directions . . . . .	314
McLeod bank . . . . .	98	Mahéla, Pointe . . . . .	289
Madagascar . . . . .	4-6	Mahinia hill . . . . .	249
Anchorage . . . . .	5	Mahitsy, Rivière . . . . .	318
Aspect . . . . .	5	Maho . . . . .	363
Eastern coast . . . . .	289-326	Mahonotsa, Nosy . . . . .	160
current . . . . .	15	Mailaka . . . . .	182
North-eastern coast . . . . .	259-288	Main channel . . . . .	91
North-western coast . . . . .	145-221	Anchorage . . . . .	92
current . . . . .	17	Tidal streams . . . . .	92
Southern coast . . . . .	326-328	Main island . . . . .	90
current . . . . .	15, 17-18	Main pass . . . . .	112
Weather . . . . .	48-51	Main, Rivière de la . . . . .	267
Western coast . . . . .	222-258	Maintapaka, River . . . . .	236
current . . . . .	17	Maintirano . . . . .	228
Madame, Ilot, light . . . . .	292	Anchorage . . . . .	230-231
Madge rocks . . . . .	69	Directions . . . . .	230
Maevatanana . . . . .	6	Landmarks . . . . .	230
Magnafy, Rivière . . . . .	323	Light . . . . .	229
Magnetic variation, Abnormal . . . . .	21	Port limits . . . . .	231
Magnuni, Ile . . . . .	122	Radio station . . . . .	231
Anchorage . . . . .	122	Signal station . . . . .	231
Magomba, Rivière de . . . . .	223	Tidal streams . . . . .	229
Mahabo . . . . .	321	Maintirano-Maty . . . . .	228-229
Mahabo mouth . . . . .	211	Anchorage . . . . .	231
Mahabo, Sommet . . . . .	318	Tidal streams . . . . .	231
Mahajamba, Baie de . . . . .	205-207	Maintirano pass . . . . .	228
Anchorage . . . . .	207	Maitampaka, Rivière . . . . .	236
Aspect . . . . .	205-206	Maitampaki, River . . . . .	236
Directions . . . . .	206-207	Majambo, Pointe de . . . . .	202
Port facilities . . . . .	207	Majunga . . . . .	210, 215
Winds . . . . .	204	Anchorage . . . . .	214
Mahajamba, Passes de . . . . .	204	Directions . . . . .	214
Mahajamba, Rivière . . . . .	206	Lights . . . . .	211
Mahajeby, Baie de . . . . .	261	Port facilities . . . . .	215
Mahale . . . . .	120	Radio station . . . . .	215
Mahambo . . . . .	298	Tidal streams . . . . .	211, 214
Mahambolona hill . . . . .	285	Makamby, Cap . . . . .	182
Beacon . . . . .	286	Makamby, Nosy . . . . .	216
Mahamindro, Rivière . . . . .	159	Makamby, Passe de . . . . .	216
Mahanara, Baie de . . . . .	278	Makamby, Pointe . . . . .	183
Mahanara, Morne de . . . . .	278	Makoen, Pointe . . . . .	131
Mahanero river . . . . .	6	Malabar island . . . . .	90
Mahanoro . . . . .	310, 310-312	Malailly . . . . .	287
Anchorage . . . . .	311	Malheureux, Cape . . . . .	346
Beacons . . . . .	311	Malheureux passe . . . . .	362
Directions . . . . .	311	Malheureux rock . . . . .	347-348
Light . . . . .	311	Mamelle, Grande . . . . .	321
Port facilities . . . . .	312		
Signal station . . . . .	312		
Mahataingina, Rivière . . . . .	278		
Mahatinzo point . . . . .	176		
Mahatsinjo, Pointe . . . . .	176		
Mahavatsy, Banc de, buoys . . . . .	250		
Mahavatsy beacon . . . . .	249		
Mahavatsy, Pointe . . . . .	249		

	Page		Page
Mamelle islet, light . . . . .	69	Mandrare, Rivière . . . . .	327
Mamelles de Natte . . . . .	300	Manenarivo, Pic . . . . .	285-286
Mamelles, Fausses . . . . .	300	Manery, Rivière . . . . .	323
Mamelles, Les . . . . .	154	Mangahafa, River . . . . .	323
Mamelons, <i>see</i> proper name		Mangerivy, Baie de . . . . .	272-274
Mamirano . . . . .	246	Current . . . . .	273
Mamoko, Nosy . . . . .	182	Directions . . . . .	273-274
Mamoutzou peninsula, light	133	Lights . . . . .	273
Manaha hill . . . . .	99	Manghily, Nosy . . . . .	226, 227
Manaha islets . . . . .	99	Mangiho, Nosy . . . . .	171
Manaivou, Baie de . . . . .	323	Mangoaka . . . . .	206, 207
Manakara . . . . .	315-317	Mangoaka, Pointe . . . . .	158
Anchorages . . . . .	317	Mangoka, Rivière . . . . .	239, 240
Beacons . . . . .	316	Mangoro, Rivière . . . . .	312
Directions . . . . .	317	Manguier boule . . . . .	303
Lights . . . . .	316	Maningory . . . . .	295
Port facilities . . . . .	317	Maningory, Rivière . . . . .	295
Signal station . . . . .	317	Manitsa, Nosy . . . . .	256
Manakara Nord . . . . .	315	Manja . . . . .	206
Manakara, North . . . . .	315	Manombo . . . . .	247
Manakara, Pointe . . . . .	202	Manombo, Rivière, Cap Saint-	
Manakara, South . . . . .	315	André . . . . .	220
Manakara Sud . . . . .	315	Manombo, Rivière, Fihérénana	246, 247
Manambao, Rivière . . . . .	223	Anchorage . . . . .	248
Manambato, Cap . . . . .	274	Manompa, Rivière . . . . .	289
Manambato, Rivière, Cap Manam-		Manonganio, Rivière . . . . .	191, 192
bato . . . . .	274	Manongarivo river . . . . .	191
Manambato, Rivière, Farafangana	318	Manoumbouarive, Rivière . . . . .	323
Manambavana, Rivière . . . . .	318	Manombu, Morne . . . . .	323
Manambero, Rivière . . . . .	277	Mantialac, Rivière . . . . .	275
Manambery, Rivière . . . . .	277	Mantialaka, Rivière . . . . .	275
Manambidy, Nosy . . . . .	272, 273	Mantzeza . . . . .	118
Manambolo, Rivière . . . . .	231, 232	Manunbu, Mount . . . . .	323
Anchorage . . . . .	232	Mapare islet . . . . .	330
Manambondro . . . . .	321, 322	Mapou bay, Little, anchorage	101
Manambondro, Rivière . . . . .	321	Mapous, Pointe des . . . . .	268
Anchorage . . . . .	322	Mapu patch . . . . .	346
Manambovo, Rivière . . . . .	327	Maques, Ilot des . . . . .	268
Manampahana, Ilot . . . . .	273	Maques, Pointe des . . . . .	184
Manampanihy, Rivière . . . . .	321	Maques, Rivière des . . . . .	267
Manampatra, Rivière . . . . .	318	Mareana, Banc, beacon . . . . .	250
Mananara . . . . .	285, 286	Marechal Galliéni shoal . . . . .	232
Mananara, Baie . . . . .	285	Marianne islet . . . . .	357
Mananara rivière, Baie d'Antongil		Marianne, Point . . . . .	111, 115
. . . . .	285, 286	Anchorage . . . . .	115
Mananara, Rivière, Vangaindrano		Aspect . . . . .	112
. . . . .	320, 321	Beacons . . . . .	113
Anchorage . . . . .	320-321	Marianne rock, La . . . . .	342
Mananivo, Rivière . . . . .	320	Maribé, Baie . . . . .	168-169
Anchorage . . . . .	320	Anchorages . . . . .	169
Mananjary . . . . .	312, 313-314	Marie Eugénie, Banc . . . . .	302
Anchorage . . . . .	314	Marie Louise islet . . . . .	86
Aspect . . . . .	313	Anchorage . . . . .	86
Beacons . . . . .	313-314	Aspect . . . . .	86
Currents . . . . .	313	Tidal streams . . . . .	82
Lights . . . . .	313-314	Marie, Récif de . . . . .	169
Signal station . . . . .	314	Marify, Nosy . . . . .	229
Mananjary, Récif de . . . . .	313	Marimbo, Rivière . . . . .	295
Mananjary, Rivière . . . . .	313	Mariner bank . . . . .	205
Manankara, Rivière . . . . .	315, 316	Maroambitsy, Baie de . . . . .	217, 217-218
Anchorage . . . . .	317	Aspect . . . . .	218
Manankarana, Baie de . . . . .	158	Maroantaly, Nosy . . . . .	226, 226-227
Mananono, Nosy . . . . .	162	Anchorage . . . . .	228
Mananonoka, Pointe . . . . .	246	Maroantsetra . . . . .	284
Mananzhari . . . . .	6	Anchorages, directions . . . . .	287-288
Manatangen, Banc de la . . . . .	262	Light . . . . .	288
Mancel, Pointe . . . . .	271	Port facilities . . . . .	288
Mandazona . . . . .	162	Signal station . . . . .	288
Mandoavoa, Pointe . . . . .	149, 159, 161	Maroazo, Passe . . . . .	248

	Page		Page
Marofotatra . . . . .	222	Mayotte, Ile— <i>contd.</i>	
Marofototra . . . . .	222	Anchorage . . . . .	116
Marohata, Pointe . . . . .	236	Aspect . . . . .	128-129
Marokafiry, Rivière . . . . .	220	Currents . . . . .	17, 129
Marolahy, Pointe de . . . . .	202	Eastern side . . . . .	132-138
Marolay, Pointe . . . . .	184	anchorage . . . . .	137, 138
Marolo, Rivière . . . . .	308, 309	aspect . . . . .	132-133
Maromanjo, Pointe . . . . .	209	beacons . . . . .	133
Maromony, Pointe . . . . .	200	lights . . . . .	133, 137-138
Maroni, Nosy . . . . .	170	passes . . . . .	134-137
Maropapango, Rivière . . . . .	183	buoyage . . . . .	135
Marosakoa . . . . .	208, 209	signal station . . . . .	138
Marosi island . . . . .	122	storm signals . . . . .	138
Marosy, Nosy . . . . .	287	North-eastern side . . . . .	131-132
Anchorage . . . . .	287-288	anchorage . . . . .	132
Marotaolana, Mont . . . . .	192	Western and southern sides . . . . .	129-131
Marotia . . . . .	218	anchorage . . . . .	130-131
Marotondro . . . . .	223	aspect . . . . .	130
Marotony . . . . .	187	directions . . . . .	131
Marron hill . . . . .	361	passes . . . . .	131
Marsouins, Rivière des . . . . .	343	buoyage . . . . .	135
Maruteza, Pointe . . . . .	161	Mbuhu, Ile . . . . .	122
Anchorage . . . . .	162	Mely, Nosy . . . . .	152
Mary Anne island . . . . .	69	Memoria, Port . . . . .	287
Mascene rocks . . . . .	73	Anchorage . . . . .	288
Masianaka, Rivière . . . . .	321	Menai island . . . . .	93
Anchorage . . . . .	322	Anchorage . . . . .	95
Masiaposa . . . . .	202	Aspect . . . . .	94
Masoala, Cap . . . . .	282, 283	Tidal streams . . . . .	95
Current . . . . .	283	Menarandra, Rivière . . . . .	255, 258
Massif, <i>see</i> proper name		Mer Rouge lagoon . . . . .	349
Massoro river . . . . .	6	Meteorological tables . . . . .	54-62
Mastique islet . . . . .	94	Meteorology . . . . .	32-62
Mât, Rivière du . . . . .	333, 343	Mètres, Banc de Neuf . . . . .	309
Matainga, Rivière . . . . .	278	Mètres, Banc de Sept . . . . .	310
Mât cassé, Le . . . . .	359	Mètres, Six, Banc des . . . . .	302, 304
Beacon . . . . .	358	Miambani, Anse . . . . .	133
Mathurin bay . . . . .	365-367	Miandroka, Nosy . . . . .	234
Anchorage . . . . .	366	Mianga, Ilot . . . . .	123
Directions . . . . .	365-366	Miangoni, Ilot . . . . .	123
Lights . . . . .	365	Michel, Ile . . . . .	92
Port facilities . . . . .	367	Microbe, Rocher, buoy . . . . .	250
Matitanana, Rivière . . . . .	315, 318	Middle Brother . . . . .	109
Matson point . . . . .	348	Middle Ground shoal . . . . .	365
Mauritius . . . . .	6-9, 343-363	Middle island . . . . .	91
Anchorage . . . . .	347	Middle islet, Baie de Mangerivy . . . . .	273
Aspect . . . . .	344	Middle islet, Cosmoledo group . . . . .	94
Current . . . . .	15	Middle islet, Diego Garcia. 111, 112, . . . . .	114
Directions . . . . .	347	Middle pass, Analalava . . . . .	197
Eastern side . . . . .	362-363	Middle pass, Diego Garcia . . . . .	112
Meteorological tables . . . . .	61	Middle reef . . . . .	229
North-western side . . . . .	347-354	Middle rock . . . . .	370
Southern side . . . . .	356-362	Milanja bank . . . . .	222
Storm signals . . . . .	351-352	Milieu, Banc du, Barren islands . . . . .	226
Tidal streams . . . . .	346	Milieu, Banc du, Maintirano . . . . .	229
Weather . . . . .	51-52	Milieu, Ile du . . . . .	99
Western side . . . . .	354-356	Milieu, Ilot du . . . . .	273
anchorage . . . . .	356	Milieu, Passe du, Analalava . . . . .	197
tidal streams . . . . .	355-356	Directions . . . . .	198
Maussi, Ile . . . . .	122	Milieu, Passe du, Morombé . . . . .	242
Mavégani . . . . .	128-129	Milieu, Piton du . . . . .	344
Mavony, Nosy, Barren islands . . . . .	226	Milieu, Rocher du . . . . .	370
Mavony, Nosy, Nosy Fisaka . . . . .	161	Millers point . . . . .	66
Anchorage . . . . .	162	Milomboka, Nosy . . . . .	285
Mavony, Nosy, Nosy Hao . . . . .	151	Miné, Cap . . . . .	263
Maxime, Baie . . . . .	260	Minirodo, Baie de . . . . .	257-258
Mayeux beacon . . . . .	319	Minni Minni anchorage . . . . .	115
Mayotta island . . . . .	116	Tidal streams . . . . .	112
Mayotte, Ile . . . . .	116, 128-138		

	Page
Minni Minni knob . . . . .	112
Minni Minni patch . . . . .	113
Mionconi, Rivière . . . . .	120
Anchorage . . . . .	120
Miremani . . . . .	120
Miremani, Anse . . . . .	120
Anchorage . . . . .	121
Miremani, Pointe . . . . .	120
Miringoni . . . . .	120
Anchorage . . . . .	120
Miroana, Baie . . . . .	155
Mirondsi . . . . .	125
Mirondsi, Pointe . . . . .	125
Misangy, Nosy . . . . .	160
Misel islet . . . . .	376
Misére . . . . .	71
Mitampy . . . . .	223
Mitaraka, Pointe . . . . .	168, 169
Mitchina bay . . . . .	236
Mitehina, Baie de . . . . .	236
Mitsamiuli . . . . .	117
Mitsio, Iles . . . . .	167-171
Anchorage . . . . .	169, 170
Current, tidal streams . . . . .	167
Mitsio, Mont . . . . .	168
Mitsio, Nosy . . . . .	167, 168-170
Aspect . . . . .	168
Eastern side . . . . .	169-170
anchorage . . . . .	170
South-western side . . . . .	169
Western side . . . . .	168-169
anchorage . . . . .	169
directions . . . . .	169
Moa, Ile . . . . .	121
Mognaméri, Ilot . . . . .	133
Mohéli, Ile . . . . .	116, 120-124
Aspect . . . . .	120
North-eastern coast . . . . .	122-124
anchorage, directions . . . . .	124
beacons . . . . .	124
signal station . . . . .	123
tidal streams . . . . .	123
Southern coast . . . . .	120-122
anchorage . . . . .	121-122
Western coast . . . . .	120
anchorage . . . . .	120
Mohila, Pointe . . . . .	130-131
Mohilla island . . . . .	116
Moka district . . . . .	7
Môle, <i>see</i> proper name . . . . .	
Mon Plaisir . . . . .	70
Mondzaza . . . . .	118
Mondzaza hill . . . . .	118-119
Mont, Montagne, Monts, <i>see</i> proper name . . . . .	
Montsapéré . . . . .	129
Moramba, Baie de . . . . .	202, 203
Anchorage . . . . .	203
Aspect . . . . .	203
Moresby channel . . . . .	108
Moresby islands . . . . .	106
Morne Carré . . . . .	129
Morne de la Pointe . . . . .	127
Morne H. . . . .	131
Morne Rouge . . . . .	130
Morne Rouge, Passe du . . . . .	131
Directions . . . . .	131
Morne, <i>see</i> proper name . . . . .	
Morne, The . . . . .	355

	Page
Morombé . . . . .	240-244
Anchorage . . . . .	243
Aspect . . . . .	241
Directions . . . . .	242-243
Signal station . . . . .	244
Tidal streams . . . . .	242
Morombé, Cap . . . . .	241
Beacons . . . . .	241, 242
Morondava . . . . .	234-235
Anchorage . . . . .	235
Beacons . . . . .	235
Current . . . . .	234
Depths . . . . .	234
Directions . . . . .	235
Landmarks . . . . .	234
Light . . . . .	234-235
Port facilities . . . . .	235
Signal station . . . . .	234
Tidal streams . . . . .	234
Morondava, Rivière . . . . .	232, 234, 235
Moroni . . . . .	117, 117-118
Anchorage, directions . . . . .	118
Beacons . . . . .	117, 118
Lights . . . . .	118
Signal station, storm signals . . . . .	118
Moroni, Mouillage de . . . . .	117-118
Anchorage, directions . . . . .	118
Beacons . . . . .	117, 118
Lights . . . . .	118
Signal station, storm signals . . . . .	118
Morotonge . . . . .	187
Morrison reef . . . . .	242
Mortar point . . . . .	348
Mouche, Anse la . . . . .	73
Mouettes, Ile aux . . . . .	286
Mouillage, <i>see</i> proper name . . . . .	
Mouniaméri islet . . . . .	133
Moury, Ilot . . . . .	273
Moyenne islet . . . . .	75
Mozambique channel : . . . . .	
Currents . . . . .	16, 17, 17-18
Weather . . . . .	47-48
Mozambique current . . . . .	9, 16-18
Mpaninabo, Pointe . . . . .	147
Mpanjaka, Banc . . . . .	223
Mpanjaka, Banc du . . . . .	226
Mpay, Nosy . . . . .	152, 153
Muchaco, Ilot . . . . .	123
Muraniembé . . . . .	129
Mutsamudu . . . . .	125
Anchorage . . . . .	126
Beacons, lights . . . . .	125
Storm signals . . . . .	126
Nab reef . . . . .	345
Nadaud house . . . . .	290
Namahory, Pointe de . . . . .	171
Namakia cliffs . . . . .	204
Namakia, Passe de . . . . .	204
Namakia, Pointe . . . . .	231
Namakia, Rivière . . . . .	216
Namangoa mouth . . . . .	232
Namela, Banc de . . . . .	229
Namela, Rivière de . . . . .	228
Namela shoal . . . . .	229
Nameld . . . . .	6
Namorona, Rivière . . . . .	315

	Page		Page
Narcissus bank . . . . .	211-212	North-east point . . . . .	74
Narendry . . . . .	201	North-East reef, Great . . . . .	132
Narendry, Baie de . . . . .	200-201	North entrance, Grand Port . . . . .	357, 360
Anchorage . . . . .	201	Directions . . . . .	360-361
Winds . . . . .	204	Tidal streams . . . . .	358
Narendry, Passe de . . . . .	195	North entrance, Port Victoria . . . . .	75-76
Narrows, the . . . . .	358	Beacons . . . . .	75-76
Nassola Lataniers . . . . .	363	Buoys . . . . .	75
Nate paps . . . . .	300	Directions . . . . .	77
Natte, Mamelles de . . . . .	300	North island, Agalega islands . . . . .	100, 101
Nattes, Ile des . . . . .	293-294	Anchorage, beacons, directions . . . . .	101
Light . . . . .	294	Aspect . . . . .	100
Natural Mark . . . . .	79	North island, Cargados Carajos shoals . . . . .	331
Nazareth bank . . . . .	332	North island, Farquhar group . . . . .	98-99
Nécessaire, Banc du . . . . .	270	Anchorages . . . . .	99-100
Neiges, Piton des . . . . .	332	Tidal streams . . . . .	100
Nelsons island . . . . .	108	North island, Seychelles . . . . .	70
Nepato, Nosy . . . . .	283	North islet, Baie de Mangerivv . . . . .	273
Neuf Mètres, Banc de . . . . .	309	North islet, East . . . . .	94
Ngabé river . . . . .	281	North islet, Ile Saint-Paul . . . . .	370
Ngontsi peaks . . . . .	281	North islet, Mahé island . . . . .	72
Nièvre, Port de la . . . . .	261, 267-269	North islet, West . . . . .	94
Anchorages . . . . .	268	North Manakara . . . . .	315
Aspect . . . . .	267	North pass, Analalava . . . . .	197
Buoys . . . . .	268	North pass, Baie Andramaimba . . . . .	153
Dock . . . . .	269	North pass, Baie de Mahajamba . . . . .	204
Lights . . . . .	267-268	North pass, Maintirano . . . . .	230
Port facilities . . . . .	269	North pass, Tamatave . . . . .	304
Radio station . . . . .	269	North point, Farquhar group . . . . .	98-99
Signals . . . . .	269	North point, Mahé island . . . . .	70
Tidal streams . . . . .	267	North reef, Ile Mayotte . . . . .	130
Ninepin rock . . . . .	370	North reef, Maintirano . . . . .	229
Noddy rock . . . . .	80	North reef, Tamatave . . . . .	302
Noeufs, Ile des . . . . .	82, 86	North-West bay . . . . .	72
Noie, Rocher . . . . .	175	North-West Lango bank . . . . .	195
Noir, Morne . . . . .	277	Nosi Bé . . . . .	171
Noir, Roche . . . . .	171	Nosikely . . . . .	318
Noir, Rocher, Manakara . . . . .	316	Nosindolo . . . . .	241
Noir, Rocher, Nossi-Bé . . . . .	175	Nosivarika . . . . .	312
Noirs, Ilots . . . . .	276	Nossi-Bé . . . . .	171-180
Noirs, Rochers . . . . .	309	Aspect . . . . .	171-172
Nord, Banc . . . . .	309	Climate . . . . .	172
Nord, Banc du . . . . .	229	Eastern side . . . . .	174-176
Nord, Chenal du . . . . .	213	anchorages . . . . .	175-176
Nord-Est, Banc du . . . . .	262	Meteorological tables . . . . .	56
Nord-Est, Chenal du . . . . .	213	Northern side . . . . .	173-174
Nord-Est, Passe du . . . . .	303-304	anchorage . . . . .	174
Nord-Est, Rocher du . . . . .	173	Southern side . . . . .	176-180
Nord, Ilot . . . . .	370	anchorages . . . . .	176, 179-180
Nord, Ilot du . . . . .	273	directions . . . . .	179
Nord-Ouest, Chenal du . . . . .	213	tidal streams . . . . .	178-179
Nord-Ouest de Lango, Banc . . . . .	195, 196	Western side . . . . .	174
Nord-Ouest, Pointe . . . . .	143	anchorage . . . . .	174
Nord, Passe . . . . .	153	Nosy Hao, Passe de . . . . .	152
Nord, Passe du, Analalava . . . . .	197	Nosy Hara, Récifs de . . . . .	155
Nord, Passe du, Baie de Mahajamba . . . . .	204	Nosy Lava, Chenal de . . . . .	195
Nord, Passe du, Iles Mitsio . . . . .	169	Nosy, <i>see</i> proper name . . . . .	
Nord, Passe du, Maintirano . . . . .	230	Nosy Vao, Passe de . . . . .	225
Nord, Passe du, Morombé . . . . .	242	Nouvel Hôpital, Pointe du . . . . .	296
Directions . . . . .	242-243	Nu, Sommet . . . . .	157
Nord, Passe du, Tamatave . . . . .	304	Numa Choa . . . . .	120
Nord, Passe du, Tuléar . . . . .	250	Anchorages . . . . .	121, 122
Tidal streams . . . . .	251	Numa Choa, Pointe . . . . .	121
Nord, Pointe . . . . .	119	Numa Choa, Port . . . . .	121
Nord, Récif du, Ile Mayotte . . . . .	130	Anchorage, directions . . . . .	121
Nord, Récif du, Tamatave . . . . .	302	Ny Andréa . . . . .	249, 253
North Brother . . . . .	109	Ny Andriana . . . . .	166
North Cousin . . . . .	69		

	Page		Page
Oani	126	Passages	29-32
Oani, Pointe, Ile Anjouan	125	Aden to Mauritius	32
Oani, Pointe, Ile Mohéli	120	Aden to Seychelles	31-32
Oani, Rade d'	125	Colombo to Seychelles	31
Observation islet	94	General remarks	29
Observatoire, Pointé de l'	273	Mauritius to Aden	32
Observatory point	111, 115	Mauritius to Mozambique	31
Oiseaux, Ile aux	322	Mauritius to Seychelles	32
Oiseaux, Ilet aux	273	Mauritius to Zanzibar	30
Olive bank, buoy	359	Mozambique to Mauritius	30-31
Oliver hill	79-80	Mozambique to Seychelles	30
Onilahé river	253	Seychelles to Aden	31
Onilahy, Rivière	253, 254	Seychelles to Colombo	31
Ony Bé, Rivière	281	Seychelles to Mauritius	32
Oravaka	165	Seychelles to Mozambique	30
Oravaka, Pointe	164, 165	Seychelles to Zanzibar	30
Oreste, Roche	134	Zanzibar to Mauritius	29-30
Orient bay, anchorages	115	Zanzibar to Seychelles	30
Orongéa, anchorage	266	Passe, Banc de la	197
Orongéa, Banc d'	266	Passe de l'Est, Grande	304
Orangéa, Passe d'	263	Passe, Ile de la, Chagos archi- pelago	106
Tidal streams	262	Passe, Ile de la, Mauritius	357
Oronjia	266	Passe, La	70
Oronjia bank	266	Passe, Passes, <i>see</i> proper name	
Oronjia pass	263	Paté, Grand	359
Orontany, Presqu'île d'	149, 161, 164	Beacon	358
Osprey shoal	238	Paté, Petit	358-359
Ouchongui	129	Beacon	358
Ouest, Banc de l'	225	Patsi	125
Ouest, Chenal de l'	213	Patsy, Pointe, beacons	125
Directions	214	Pearl breaker	331
Ouest d'Anakao, Banc	229	Pearl island	331
Ouest de Lango, Banc	195, 195-196	Peiho	135
Ouest, Ile de l'	239	Pietro, Récif	135
Ouest, Pointe	119	Pelé, Mont	159
Outer reef	186, 201, 219-220	Pelican islet	84
Current	201	Penelope's pie	298
Ovy, Nosy	189	Percée, Roche	122
Anchorage	190	Peros Banhos	106-108
Owen, Point, Baie de Mangerivy	272	Anchorages	107
Owen point, Faux Port	272	Directions	107-108
Oyster bay	366	Tidal streams	107
Oyster Bay valley	363	Persépolis Nord, Banc	240
Oyster Bay village	363, 366	Persépolis Sud, Banc	240
		Petit Bénard	332
		Petit Paté	358-359
		Beacon	358
Page beacon, Le	319	Petit récif, Le	302, 304
Pagoda islet	94	Petite Anse, Pointe de la	340
Pahanjy, Nosy	147-148	Petite Passe, Bancs de la	155
Pain de Sucre, Ambina Sakaleo	312	Petite Rivière bay	354
Pain de Sucre, Baie de Diégo- Suarez	261	Petite Rivière point	354
Pain de Sucre, Baie de Mahajamba	206	Petites Salazes	332
Pamanzi	132, 133	Philomel shoal	224
Beacons	136	Pic, <i>see</i> proper name	
Pamanzi, Baie de	134	Picard, Ile	90
Anchorages	137	Piccolo, Cap	282
Directions	138	Pierrot islet	367
Pamanzi, Récif	134	Pieter Both mountain	344
Pamplemousses district	7	Pigeon House rock	345
Pamplemousses river	348	Pilot patches	73
Panantsova	200	Pilot shoal	142
Pangalanes	306	Pilotage	22
Paps	220	Piment point, Arsenal bay	346
Parry patch	113	Piment point, Grand Port	359
Parsons reef	245	Pintade, Pointe	271
Paso, Nosy	170	Pirogues, Passe des	362
		Piton, Le	366



	Page		Page
Piton, Pointe du . . . . .	343	Pouce, Le, south-eastern coast of	321
Piton Rond . . . . .	343	Madagascar	349
Piton, <i>see</i> proper name		Pouce, The . . . . .	362
Pitt bank . . . . .	110	Poudre d'Or . . . . .	84
Plaine, <i>see</i> proper name		Poule, Ile . . . . .	153, 259
Plaines Wilhems district	7	Poules Bleu . . . . .	73
Plat, Rocher . . . . .	316	Pracel, Banc de . . . . .	220
Plate, Ile. . . . .	270	Pracel bank . . . . .	224-228
Plateau, Anse du . . . . .	176-177	Anchorages . . . . .	225-226, 228
Anchorages . . . . .	179-180	Currents . . . . .	224
Beacons . . . . .	177	Directions . . . . .	228
Light . . . . .	177	Tidal streams . . . . .	225, 228
Plateau, Sommet . . . . .	193	Praslin island . . . . .	63, 66
Plates, Roches . . . . .	120	Anchorages . . . . .	67
Platte island . . . . .	81	Currents . . . . .	63
Anchorages . . . . .	81	Presqu'île, <i>see</i> proper name	
Pleiades, Les . . . . .	172	Pressure . . . . .	36-38
Pointe, <i>see</i> proper name		Prévoyant, Roche . . . . .	169
Pointe-Sud-Ouest, Rochers de la	194-195	Prévoyante, Récif de la . . . . .	135
Poivre islets . . . . .	85-86	Providence island . . . . .	97
Anchorages . . . . .	85	Anchorages . . . . .	97
Current . . . . .	86	Aspect . . . . .	97
Tidal streams . . . . .	85-86	Tidal streams . . . . .	97-98
Police bay . . . . .	73	Prudente, Banc de la . . . . .	130
Police point . . . . .	73	Anchorage . . . . .	131
Polygone, Pointe du . . . . .	267	Prunes, Ile aux . . . . .	301, 302
Polymnie island . . . . .	91	Light . . . . .	302
Polyte islet . . . . .	94	Purdy sand . . . . .	227-228
Pomoni . . . . .	126	Pyramid rock . . . . .	80
Anchorages . . . . .	127	Pyramide, Rocher . . . . .	316
Beacons . . . . .	127		
Directions . . . . .	127		
Pomoni, Mouillage de . . . . .	126-127		
Pont du Roi . . . . .	335	Quai la Rose, Pointe du . . . . .	343
Port limits . . . . .	22	Quatre Frères, Les . . . . .	170
Port Louis . . . . .	344, 348-354	Quatre-Vingt Brisants . . . . .	364
Anchorage . . . . .	350-351	Queue de Lango, La . . . . .	197
Buoyage . . . . .	349-350	Quille, Rocher . . . . .	370
City . . . . .	354	Quoin channel, tidal streams . . . . .	346
Depths . . . . .	349		
Directions . . . . .	350		
Landmarks . . . . .	348-349		
Pilotage . . . . .	349		
Port facilities . . . . .	354	Race jetty . . . . .	362
Signal station . . . . .	351	Race point . . . . .	99
Port Louis district . . . . .	7	Radama, Iles . . . . .	186, 189-190
Port Mathurin village . . . . .	366	Anchorage . . . . .	190
Port, <i>see</i> proper name		Radama, Port, <i>see</i> Baie de	
Port South-East village . . . . .	363	Sahamalaza	191
Port Victoria . . . . .	74-79		
Anchorages . . . . .	76	Rade, <i>see</i> proper name	
Beacons . . . . .	74, 75, 75-76, 78	Radio stations . . . . .	26
Buoys . . . . .	75, 76	Rafales, Anse des . . . . .	265
Directions . . . . .	77, 78	Anchorage . . . . .	266
Light . . . . .	74	Rafaralahy, Baie de . . . . .	190, 190-191
Pilots . . . . .	76	Anchorages, directions . . . . .	191
Port facilities . . . . .	78-79	Rajaswaree shoal . . . . .	99
Radio station . . . . .	78	Ramanetaka, Baie . . . . .	190, 193
Signals . . . . .	78	Rambler bay . . . . .	113, 114
Portail, Pointe du . . . . .	340	Anchorages . . . . .	115
Porte, Sommet . . . . .	187	Ranavalona, Cap . . . . .	326
Possession, Anse . . . . .	68	Rance, Passe de la . . . . .	151
Possession, Cap de la . . . . .	336	Rangazava, Banc . . . . .	302
Possession, La . . . . .	336	Rangotso . . . . .	160
Anchorage . . . . .	337	Ranobé, Baie de . . . . .	246, 247
Potopoto . . . . .	155, 159	Anchorage, directions . . . . .	248
Pouce, Le, north-eastern coast of		Beacon . . . . .	248
Madagascar	261	Tidal streams . . . . .	248
		Ranobe, Rivière . . . . .	223

	Page		Page
Ranofotsy, Baie de	326	Rivière Coco village	363
Anchorage	327-328	Rivière du Rempart district	7
Ranopasé	239	Rivière Noire, Piton	344
Rantabé, Baie	164	Rivière point, Petite	354
Raphael, Ile	330	Rivière, <i>see</i> proper name	
Anchorage	331	Roche, Ile, beacon	357
Tidal streams	331	Roche Noire point	348
Ras, <i>see</i> proper name		Roche, <i>see</i> proper name	
Rat islet	79	Rocher, Pointe du	183
Ratafany, Ilot	242	Rocher, Rochers, <i>see</i> proper name	
Ratafany, Nosy	242	Roches Canales, Les	67
Rateau, Rocher	169	Roches, <i>see</i> proper name	
Ravina, Nosy	287	Rocheux, Ilot	286
Ravine à Malheur, Pointe de la	336	Beacon	285
Ravine, <i>see</i> proper name		Rocky point	346
Raymond islet	272	Rodo, Baie du	272
Raynaud, Mont	261	Rodriguez island	363-367
Raz de Marées	334	Current	365
Recherche, Pointe de la	368	Meteorological tables	62
Récif, Ilot du	134	Pilotage	365
Récif islet, anchorage	80	Tidal streams	365
Récif, <i>see</i> proper name		Weather	52-53
Red mount	130	Rogier, Récif	244-245
Regulating entry and departure of vessels, singals	28	Romanche, Banc de la	205
Regulations:		Ronde, Colline	310
Approaching French territorial waters in time of war	23-25	Rontonina, Banc	227
Remire reef	83	Rôti, Sommet	160
Rempart, Mount	344	Roty, Nosy	174
Rempart river	355	Rouge, Mont	360, 361
Rempart, Rivière du	362	Rouge point	68
Renommée rock	80	Rouillard point	362
Repairs	22	Round apex	92
Requin bank	72	Round islet, Mauritius	345
Ressource islet	84	Round islet, Praslin island	66
Tidal streams	84	Round islet, St. Anne island	75
Réunion, Ile de la	332-343	Round peak	70
Aspect	332-333	Roûre, Banc	370
Currents	15, 333-334	Roussin shoal	331
Eastern side	343	Rova, Colline de	210
Meteorological tables	60	Rover reef	140
Northern side	342-343	Royal bay	80
anchorages	342-343	Royal pass	290
aspect	342	Royale, Passe	290
light	342	Ruby shoal	233
North-western side	336-340	Rue, Point La	79
anchorages	338, 340		
aspect	336		
current	337		
lights	336, 337, 340		
Pilotage	334		
Radio station	334		
Signal stations	334-335		
Southern side	342		
Western side	340-342		
anchorages	341		
aspect	340		
light	341		
Weather	51		
Riana, Rivière	315		
Rietz passe	362		
Rigny, Baie	271		
Anchorage	271		
Current	270		
Directions	271		
Rip bank	345-346		
River bay, Grand	349		
Rivière bay, Petite	354		

*NOTE.—All names prefixed by Saint or Sainte will be found indexed in alphabetical order under the letter S.*

Saint-André, Cap	145, 186, 221
Current	221
St. Anne channel	75, 76
Anchorage	76
Beacon	76
St. Anne island, beacons	74
St. Ann's bay	66
St. Augustin, Baie de	253-254
Anchorage	253-254
Aspect	253
Directions	253
Tidal streams	253
St. Augustine river	253
St. Brandon shoals	329
Saint-Denis	333, 335-336
Abnormal magnetic variation	336
Anchorage	335, 336
Directions	335-336

**NOTE.**—All names prefixed by Saint or Sainte will be found indexed in alphabetical order under the letter S.

	Page		Page
Saint-Denis— <i>contd.</i>		Sainte-Marie, Port	292-293
Landmarks	335	Anchorage	293
Lights	335	Beacon	293
Radio station	334	Buoyage	292
Radio D.F. station	336	Directions	293
Saint-Denis, Rivière	335	Landmarks	292
Saint-Etienne, Rivière	333	Lights	292
St. Francois island	88	Port facilities	293
St. Gabriel	363	Signal station	293
St. Gerant, Passe	362	Sainte-Rose, anchorage	343
Saint-Gilles	340	Sainte-Suzanne	342
Anchorage	341	Anchorage	342-343
St. Jacques, Passe	356	Sainte-Suzanne, Rivière	333
St. James anchorage	101	Sainte-Thérèse works	338
St. James cathedral	350	Saba, Nosy	194
Saint-Joseph	342	Sable, Ile de	329
St. Joseph islet	84	Sable, Mont de	271
Tidal streams	84	Sable, Pointe au	354
Saint-Leu	340	Sable, Pointe de, Baie de Bombé-	210
Anchorage	341	toke	211
Saint-Louis	341	Light	211
St. Louis hill	71	Sable, Pointe de, Baie de	
Saint-Louis, Piton	324	Mangerivy	273
St. Martin, Mount	361	Sables, Plaine de	332
Saint-Paul	333, 339	Sables, Pointe des	266
Saint-Paul, Baie de	339-340	Sables-Blancs, Pointe des	342
Anchorage	340	Sada, Fort de	190
Lights	340	Sada, Pointe	218
Signal station	340	Saddle islet	124
Winds	339	Sahalémy, Rivière	284
Saint-Paul, Ile	367-368, 369-371	Sahamalaza, Baie de	190, 191-193
Anchorage	370	Anchorage	193
Aspect	369	Aspect	192
Current	18	Directions	192-193
Tidal streams	369-370	Tidal streams	192
Weather	53	Sahamantsy, Rivière	290
Saint-Philippe	342	Sahantsio river	6
Saint-Pierre	333, 340, 341-342	Sahave river	6
Anchorage	341	Sahazo	232
Depths	341	Sahinana, Rivière	167
Light	341	Sail rocks	120
Pilotage	341	Saint, <i>see</i> under S	
Port facilities	342	Sainte Rita, Port	100
Signal station	342	Anchorage	101
St. Pierre island, anchorage	96	Tidal streams	101-102
St. Pierre islet	68	Sainte, <i>see</i> under S	
St. Sébastien, Cap	149, 161	Sakaleona, Rivière	312
Tidal streams	163-164	Sakalone river	6
St. Thomas anchorage	93	Sakarivo	321
Tidal streams	93	Sakatia	174
St. Vincent, Cap	244, 245	Salara, Analalava	194
St. Vincent, River	241	Anchorage	195, 196
Sainte-Benoît	343	Directions	195-196
Sainte-Luce, Baie de	289, 322, 322-323	Salara, Fihérénana	247
Anchorage, directions	323	Salazamay, beacons	304
Sainte-Marie, anchorage	342	Salazes, Petites	332
Sainte-Marie, Canal	294-296	Salomon islands	105-106
Anchorage	295, 296	Anchorage	105, 106
Currents	295	Directions	105-106, 106
Directions	295-296	Tidal streams	106
Sainte-Marie, Cap	258	Salvatore, Port	284
Current	9, 15, 17	Sambao, Rivière	222-223
Sainte-Marie, Ile	290-294	Anchorage	223
Eastern side, anchorages	294	Sambava	277, 279, 280
Western side	291-294	Anchorage	279
anchorage	291-293	Beacons	279
lights	291, 292, 294	Directions	279
tidal streams	291	Sambava, Rivière de	279
Sainte-Marie, Pointe	342	Sambirano, Piton de	278

	Page		Page
Sambirano, Pointe . . . . .	278	Signal hill . . . . .	71
Sambirano, Rivière . . . . .	181	Signal mountain . . . . .	349
Samia, Ilot . . . . .	123	Signal station . . . . .	351
Sand Islet reef . . . . .	237	Signals . . . . .	26-28
Sandringham reef . . . . .	345	Aircraft distress . . . . .	26
Sandy islet . . . . .	364	French submarines . . . . .	28
Sangajira, Pointe . . . . .	188, 189	Lloyd's signal station . . . . .	28
Sankaze, Rivière . . . . .	271	Regulating entry and departure of vessels . . . . .	28
Sanson, Pointe . . . . .	271	Storm signals . . . . .	27-28
Santon, Banc . . . . .	229	Madagascar . . . . .	27-28
Sanzi, Ile . . . . .	122	Mauritius . . . . .	351-352
Saolara . . . . .	253	Réunion . . . . .	334-335
Anchorage . . . . .	253-254	Vessels inconvenienced by searchlights . . . . .	28
Saphir, Banc . . . . .	294	Silhouette island . . . . .	63, 70
Sappho beacon . . . . .	359	Simiano, River . . . . .	295
Sappho reef . . . . .	359	Simpson, Mount . . . . .	71
Saradrano . . . . .	205	Simpson reef . . . . .	227
Sarodrano, Baie de St. Augustin . . . . .	249	Single ships approaching squadrons or aircraft carriers . . . . .	29
Sarodrano, Maintirano, beacon . . . . .	229	Siren island, anchorage . . . . .	331
Sarodrano, Pointe . . . . .	249	Sister, East . . . . .	69
Sarondrano pass . . . . .	250	Sister, West . . . . .	69
Satrana, Nosy . . . . .	273	Six islands . . . . .	109
Satza, Nosy . . . . .	166	Six Mètres, Banc des . . . . .	302, 304
Savane, Port, beacon . . . . .	356	Sizibongi, River . . . . .	232
Savane river . . . . .	356	Slot van Capelle . . . . .	144
Savanne district . . . . .	7	Smith point . . . . .	370
Saya de Malha bank . . . . .	102-103	Soa, Roche . . . . .	173
Current . . . . .	103	Soahanina, Rivière . . . . .	231
Saziley du Milieu, Passe . . . . .	129, 137	Soalala . . . . .	218, 219
Directions . . . . .	137	Soamianina, Rivière . . . . .	295
Tidal streams . . . . .	137	Soanierana . . . . .	295, 296
Saziley du Nord, Passe . . . . .	136	Anchorage . . . . .	296
Saziley du Sud, Passe . . . . .	137	Soeurs, Les Deux . . . . .	179, 181
Saziley Middle passage . . . . .	129, 137	Sohazo . . . . .	232
Saziley North passage . . . . .	136	Anchorage . . . . .	233
Saziley, Passes . . . . .	136	Sommet, <i>see</i> proper name . . . . .	
Saziley, Pointe . . . . .	130, 133, 137	Sorciers, Ile des . . . . .	290
Beacons . . . . .	133	Sorciers, Pointe des . . . . .	292
Saziley South passage . . . . .	131	Light . . . . .	292
Sea temperature . . . . .	45	Soudzou . . . . .	117
Seagull shoal . . . . .	64	Beacon . . . . .	117
Sebert, Mount . . . . .	71	Light . . . . .	118
Sel point . . . . .	79, 80	Souffleur, the . . . . .	356
Sel, Pointe du . . . . .	365	Souillac, Ile . . . . .	322
Selle de Betsizaraina, La . . . . .	310	Souillac, Port, beacon . . . . .	356
Selle de Vatoman dry, La . . . . .	307	Souris islet . . . . .	80
Selle, La, Iles Comores . . . . .	124	South Andemba river . . . . .	228
Anchorage . . . . .	126	South banks . . . . .	97
Selle, La, Madagascar . . . . .	153, 157	South Brother . . . . .	109
Sentinelle, Rocher . . . . .	147	South-East island . . . . .	79
Sept Mètres, Banc de . . . . .	310	South-East passage . . . . .	94-95
Sepulchre islet . . . . .	265	South-East, Port . . . . .	367
Sepulcre, Ile du . . . . .	265	South-East reef . . . . .	229
Serpent islet . . . . .	345	South-east trade drift . . . . .	10, 18-19
Serpent, Le Grand . . . . .	172	South island, Agalega islands . . . . .	100, 101
Serpent, Pointe du . . . . .	249	Anchorage . . . . .	101
Seychelles group . . . . .	2-4, 63-81	Aspect . . . . .	100
Anchorage . . . . .	66, 67, 70, 72, 73, 76, 78	Light . . . . .	101
Currents . . . . .	13, 14, 15, 63-64	Tidal streams . . . . .	101-102
Depths . . . . .	63	South island, Aldabra islands . . . . .	91, 92
Directions . . . . .	63	South island, Cosmoledo group . . . . .	94
Lights . . . . .	66, 73, 74	South island, Farquhar group . . . . .	99
Weather . . . . .	45-46	South Manakara . . . . .	315
Seychellois, Morne . . . . .	71	South pass, Analalava . . . . .	198
Shaba, Nosi . . . . .	194	South pass, Baie Andramaimba . . . . .	153
Shark rock . . . . .	67	South pass, Baie de Tintinga . . . . .	290
Shark rocks, tidal streams . . . . .	87		
Shendini, anchorage . . . . .	119		
Sherard Osborn patch . . . . .	64		

	Page		Page
South pass, Maintirano . . . . .	229	Suzi bank . . . . .	174
South pass, Rade de Tuléar . . . . .	250	Swan shoal . . . . .	64
South pass, Tamatave . . . . .	304		
South point, Great . . . . .	360		
South point, Iles Mitsio . . . . .	169		
South point, Pamanzi . . . . .	134		
South reef, Pracel bank . . . . .	227	Table, Banc de la . . . . .	197
South reef, Tamatave . . . . .	307	Table, Fausse . . . . .	278
South rock, Ile Glorieuse . . . . .	139	Table, Mont de la, Baie de	
South rock, Nosy Komba . . . . .	178	Mahajamba . . . . .	202
South-West passage . . . . .	94	Table, Mont de la, Massif	
Tidal streams . . . . .	95	d'Antalaha . . . . .	278
South-West rocks . . . . .	194	Table, Pointe de la . . . . .	342
Southern entrance . . . . .	357-358, 359	Tafara, Nosy . . . . .	250
Beacons, buoyage . . . . .	359	Tafondro, Pointe, Ile Sainte-Marie . . . . .	291
Directions . . . . .	360	Tafondro, Pointe, Nossi-Bé . . . . .	174, 175
Tidal streams . . . . .	358	Beacons . . . . .	175
Southern islets . . . . .	273	Takamaka, Anse . . . . .	73
Southern Ocean current . . . . .	9, 10, 18	Takamaka, Ile, anchorage . . . . .	106
Souzy, Banc . . . . .	174	Takamaka rocks . . . . .	73
Soy, Nosy . . . . .	194, 195	Tala, Pointe . . . . .	246
Speakers bank . . . . .	105	Tamarin bay . . . . .	355
Spur reef . . . . .	112	Tamarin, Mount . . . . .	355
Squadrons or aircraft carriers,		Tamarin point . . . . .	355
single ships approaching . . . . .	29	Tamarin river . . . . .	355
Squalls . . . . .	40	Tamatave . . . . .	289, 300, 300-306
St., see under S . . . . .		Anchorages . . . . .	305
Star bank . . . . .	258	Aspect . . . . .	301
Star reefs . . . . .	258	Beacons . . . . .	304, 305
Stork patch . . . . .	73	Buoys . . . . .	303
Storm signals . . . . .	27-28	Currents . . . . .	15, 301
Madagascar . . . . .	27-28	Deratisation . . . . .	306
Mauritius . . . . .	351-352	Directions . . . . .	303-305
Réunion . . . . .	334-335	Landmarks . . . . .	301
Suadsu . . . . .	117	Lights . . . . .	302, 303
Suarez, Ile . . . . .	260	Meteorological tables . . . . .	58
Submarine cables . . . . .	22-23	Pilots . . . . .	301-302
Sud, Banc . . . . .	310	Port facilities . . . . .	306
Sud-Est, Banc du . . . . .	229	Radio station . . . . .	306
Sud-Est, Pointe . . . . .	296, 297	Signal station . . . . .	306
Beacon . . . . .	297	Tamboabo . . . . .	253
Sud, Ilots du . . . . .	273	Tambohorano . . . . .	223
Sud, Passe . . . . .	153	Anchorage . . . . .	223
Sud, Passe du, Analalava . . . . .	198-199	Tambohorano, Banc de . . . . .	223
Sud, Passe du, Baie de Tintinga . . . . .	290	Tampaoly, Rivière . . . . .	284
Current . . . . .	290	Tampolo . . . . .	284
Sud, Passe du, Maintirano . . . . .	229	Tampolo, Anse de . . . . .	284
Directions . . . . .	230	Anchorage . . . . .	285
Sud, Passe du, Morombé . . . . .	242	Tampolo, Pointe . . . . .	284
Directions . . . . .	243	Tananarive . . . . .	5
Tidal streams . . . . .	242	Tanandava . . . . .	190
Sud, Passe du, Tamatave . . . . .	304-305	Tanga, Nosy, Pointe du Cratère . . . . .	174
Sud, Passe du, Tuléar . . . . .	250-251	Tanga, Nosy, Pointe Mandoavoa . . . . .	162
Anchorage . . . . .	254	Tanifotsy, Cap . . . . .	259
Tidal streams . . . . .	251	Beacons . . . . .	263
Sud, Pointe, Iles Mitsio . . . . .	169	Tanikeli . . . . .	177
Sud, Pointe, Pamanzi . . . . .	134	Tanimandry . . . . .	307
Sud, Récif du . . . . .	307	Tanio, Pointe . . . . .	300, 301
Anchorage . . . . .	308	Anchorage . . . . .	305
Sud, Rocher, Ile Glorieuse . . . . .	139	Lights . . . . .	303
Sud, Rocher, Nosy Komba . . . . .	178	Tanjodaingo, Cap . . . . .	283
Sud, Rochers du . . . . .	261	Tanjona, Cap, Baie d'Ambakaka . . . . .	282
Sudest, Ile . . . . .	109	Tanjona, Cap, Baie d'Antongil . . . . .	286
Sugar Loaf, east coast of		Tanjona, Cap, Baie de	
Madagascar . . . . .	312	Maroambitsy . . . . .	216
Sugar Loaf, west coast of		Tanjona, Cap, Trois Frères . . . . .	274
Madagascar . . . . .	206	Tanjona, Passe de . . . . .	216-217
Surprise, Banc de la . . . . .	135	Tanykely . . . . .	177
Surprise shoal . . . . .	226	Light . . . . .	177-178

	Page		Page
Tanylatsaka, Pic du . . . . .	172	Trois Frères, Madagascar . . . . .	274
Taolampia, Rivière . . . . .	236	Trois Frères, Mahé island . . . . .	71
Tappe à Terre . . . . .	101	Trois Iles . . . . .	99
Taranta . . . . .	219	Tromelin island, anchorage . . . . .	329
Tata point . . . . .	246	Trompeuse rocks . . . . .	69
Tatezambato, Rivière . . . . .	187-188	Tronovasatra plateau . . . . .	228
Taunton Castle shoal . . . . .	225	Trou D'eau Douce . . . . .	363
Tazar point, beacon . . . . .	361	Trou Fanfaron . . . . .	349, 352
Temperature, sea . . . . .	45	Trou, Ile du . . . . .	94
Tendraka, Baie . . . . .	175	Trous d'Argent . . . . .	363
Tendraka, Ile . . . . .	175	Trozona, Nosy . . . . .	242
Tent rock . . . . .	253	Tsara Bajina . . . . .	171
Tente, Rocher . . . . .	253	Tsaramborona . . . . .	261
Ternay bluff . . . . .	72	Tsiala, Baie . . . . .	265
Ternay, Cape . . . . .	72	Tsiankazo . . . . .	161
Ternay pass . . . . .	72	Tsihananina, Cap . . . . .	281
Ternay, Port . . . . .	72	Tsijobonina, River . . . . .	232
Terre-Sainte . . . . .	341	Tsimanandrafoza . . . . .	232
Tetezambato river . . . . .	187	Anchorage . . . . .	233
Tête mi-pelée . . . . .	321	Tsimanenoakoho, Passe de . . . . .	205
The Blacksmiths rocks . . . . .	346	Tsimanenoakoho, Rivière . . . . .	208
The Blinder reef . . . . .	345	Tsimipaika, Baie de . . . . .	180, 180-181
The Carpenters rocks . . . . .	346	Tsingilofilo, Baie de . . . . .	241
The Citadel . . . . .	349	Tsingilofilo, Cap . . . . .	240-241, 241, 244
The Morne . . . . .	355	Tsinjomantsy, Pointe . . . . .	206
The Pouce mountain . . . . .	349	Tsiomaro rock . . . . .	223
The Thumb, Grand Port . . . . .	358	Tsiribihina, Rivière . . . . .	232
Thérèse island . . . . .	72	Anchorage . . . . .	233
Thétis, Banc de la . . . . .	201, 216	Tidal streams . . . . .	234
Thetis bank . . . . .	206	Tsiringidringitra, Nosy . . . . .	166
Three Brothers, Great Chagos bank . . . . .	109	Tsitamperina . . . . .	170
Three Brothers, Madagascar . . . . .	274	Tsoa, Anse . . . . .	123
Three Fathom bank . . . . .	302	Tuléar . . . . .	249, 252-253
Thumb peak . . . . .	349	Light . . . . .	249-250
Thumb, The, Grand Port . . . . .	358	Meteorological tables . . . . .	57
Timпой . . . . .	242	Port facilities . . . . .	253
Tintinga, Baie de . . . . .	289-290	Radio station . . . . .	252
Anchorage . . . . .	290	Signal station . . . . .	253
Current . . . . .	290	Winds . . . . .	253
Directions . . . . .	290	Tuléar, Rade de . . . . .	248
Pilots . . . . .	290	Anchorage . . . . .	251-252
Tintinga point . . . . .	289	Directions . . . . .	250-251
Tintinia, Pointe . . . . .	289	Lights . . . . .	249-250
Tirailleuse, Sommet . . . . .	148	Pilotage . . . . .	251
Toky, Baie de . . . . .	272	Port facilities . . . . .	253
Toloho, Nosy, Analalava . . . . .	195	Radio station . . . . .	252
Toloho, Nosy, Iles Mitsio . . . . .	170	Signal station . . . . .	253
Tombeau bay . . . . .	348	Tidal streams . . . . .	251
Tombeau point . . . . .	348	Winds . . . . .	253
Tombeau river . . . . .	348	Tullear . . . . .	247
Tombée Manja . . . . .	207	Turquoise bank . . . . .	209
Tombée Marotaolana . . . . .	195, 196		
Tomitzy, Rivière . . . . .	232		
Tonnelier island . . . . .	349		
Tonnerre, Baie du . . . . .	261, 265		
Tony . . . . .	247, 248	Uchongui . . . . .	129
Tony, Pointe . . . . .	247	Umzinto bank . . . . .	98
Topaze bank . . . . .	65		
Toréki, Nosy . . . . .	261		
Torotoro . . . . .	321		
Tortue, La . . . . .	172		
Tortue, Pointe . . . . .	261		
Tortue rock . . . . .	79		
Touareg, Banc du . . . . .	182	V-shaped troughs . . . . .	44-45
Tozer patch . . . . .	256	Vache, Isle . . . . .	72-73
Tranofotaka, Pointe . . . . .	219	Vache Marine, Ile . . . . .	107-108
Trapèze, Sommet . . . . .	265	Vacoas, Passe . . . . .	362
Triangulaire, Cap . . . . .	274	Vaha, Nosy . . . . .	149-150
Trois Dames . . . . .	72	Vailheu, Récif . . . . .	119
		Valavo, Nosi . . . . .	222
		Valiha, Nosy, Cap St. Sébastien . . . . .	162

	Page		Page
Valiha, Nosy, Iles Radama .	189, 190	Voalava, Nosy .	222-223
Vangaindrano .	320	Vohémar .	275, 277
Vao, Nosy .	224-225	Vohémar, Baie de .	274, 275-277
Anchorage .	226	Anchorage .	276
Vaquoas islet .	357	Aspect .	275
Varangue .	343	Beacons .	275
Varenta, Lac .	307	Buoy .	275-276
Variation, Abnormal magnetic .	21	Directions .	276
Vatanombi point .	201	Lights .	275
Vatomainty, Cap .	265	Port facilities .	277
Vatomandéfoka .	246	Signal station .	277
Vatomandry .	307, 308-309	Tidal streams .	275
Anchorage .	309	Vohemar point .	275
Current .	308	Vohemaso fort .	297
Directions .	309	Beacon, light .	297
Light .	308	Vohidrotra .	300
Signal station .	309	Vohimassoa fort .	297
Vatomandry, La Selle de .	307	Vohitrakoholahy peak .	310
Vatonomby, Pointe .	201	Vohitravoha .	301
Vatou, Ilot .	133-134	Volana, Nosy, beacon .	263
Vatovavy .	313	Volla, Banc .	224
Vaucluse .	135	Voltaire's Face peak .	358
Vaucluse, Banc du .	224	Vorona, Nosy, Ambariotélo, light .	178
Vaucluse bank .	233	Vorona, Nosy, Baie de Tintinga .	290
Vaudreuil, Banc du, Baie de		Vory, Nosy .	165
Rafarahy .	191	Vulla sand .	224
Vaudreuil, Banc du, Passe de		Vulture rock .	222
Tsimanenoakoho .	205		
Vaudreuil, Banc du, Vatomandry .	310	Weather, local .	45-53
Vaudreuil, Bances du .	226	Agalega islands .	45-46
Vaudreuil bank .	238	Amirante isles .	45-46
Vavanirangi, Rivière .	282	Chagos archipelago .	46-47
Vazoana, Nosy .	169	Comores, Iles .	47
Vé, Nosy .	255	Farquhar group .	45-46
Anchorage, directions .	255	Madagascar .	48-51
Tidal streams .	255	Mauritius .	51-52
Vedette, Pointe .	147	Mozambique channel .	47-48
Venus, Point .	366	Réunion .	51
Veringotra .	287	Rodriguez island .	52-53
Verronge islet .	330	Saint-Paul, Ile .	53
Vert, Banc .	172	Seychelles .	45-46
Verte, Ile, Baie d'Ambavatohy .	184	West Anakao shoal .	229
Verte, Ile, Baie de Bombétoke .	210	West channel .	91
Verte, Ile, Baie de Sahamalaza .	192	West island .	91
Verte, Ile, Baie de Vohémar .	275	West islet, Baie d'Ampasilava .	239
Verte, Ile, Ile Mayotte .	132	West islet, Diego Garcia .	111, 112, 114
Beacon .	132	West Lango bank .	195
Vertes, Roches .	139	West North islet .	94
Vessels inconvenienced by search-		West point .	91
lights, signals .	28	West shoal .	225
Vestal reef .	189	West Sister .	69
Vestal shoal .	224	Western pass .	365
Victoria .	3	Directions .	365-366
Victoria pier .	77, 79	Western patch .	365
Victoria, Port, <i>see</i> Port Victoria .	74-79	Whale rock .	348
Victory bank .	108	Whale rocks .	67
Vigilant, Banc du .	204	Whales Back .	245
Vigilant bank .	218	Wight bank .	110
Vigilant shoal .	64	William, Fort .	349
Vilamatsana .	220, 221	William Pitt bay .	149
Vilamatsana, Rivière de .	221	Wilson's storehouse .	125
Vilijany, Pointe .	169	Winds .	38-40
Vinambé, Baie .	283	Windsor Castle .	145
Vinanivao, Rivière .	282-283	Wizard island .	93
Visibility .	45	Anchorage .	95
Vlaming, Pointe .	368	Aspect .	94
Voailava, Cap .	145, 148		

	Page		Page
Wizard reef . . . . .	98	Zamburu island . . . . .	130
Wreck rock . . . . .	139	Zamburu pass . . . . .	129
		Zanguilles point. . . . .	68
		Zaudzi . . . . .	134
Yang Tse . . . . .	161	Zélée, Banc de la . . . . .	140
Yvonne, Banc de l' . . . . .	262	Zoroaster shoal . . . . .	65



**PUBLICATIONS**  
**of the**  
**HYDROGRAPHIC DEPARTMENT.**

---

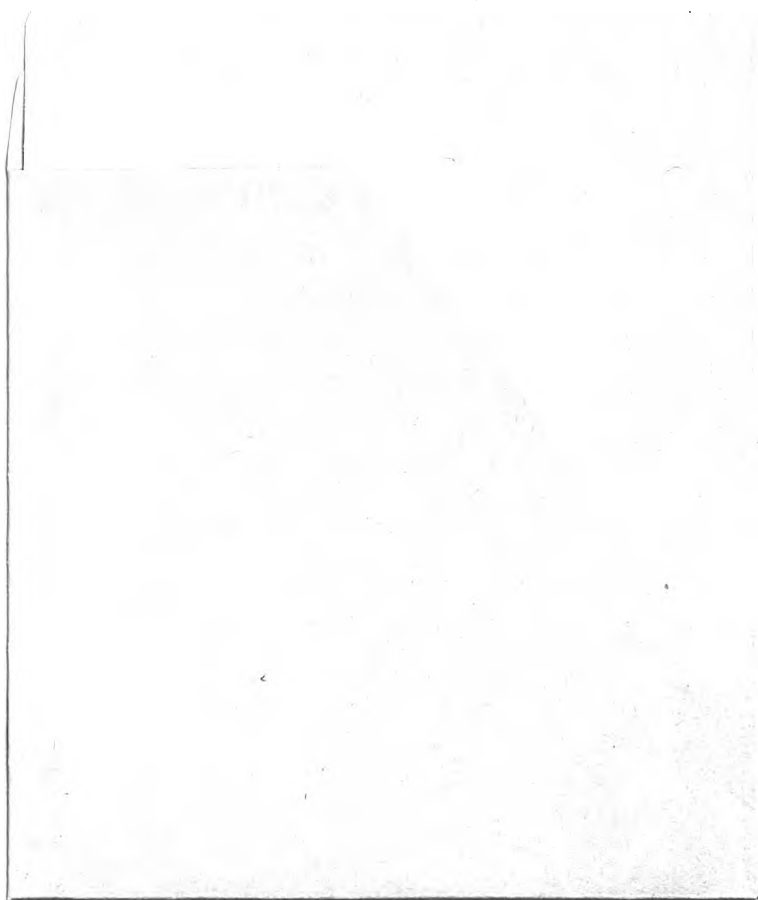
A complete list of the Sailing Directions, Charts and other works published by the Hydrographic Department of the Admiralty, together with a list of Agents for their sale, is contained in the "Catalogue of Admiralty Charts and other Hydrographic publications," published annually; price 1/- nett.

The list of Agents, referred to above, and from whom this catalogue can be obtained, is also promulgated in Admiralty Notice to Mariners No. 2 of each year.

---









UNIVERSITY OF MINNESOTA

wils

656 G79si

Great Britain. Hydrographic Dept.

South Indian Ocean pilot, comprising Mad



3 1951 002 438 151 Q

**WILSON  
ANNEX**